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# FOOD MANUFACTURE

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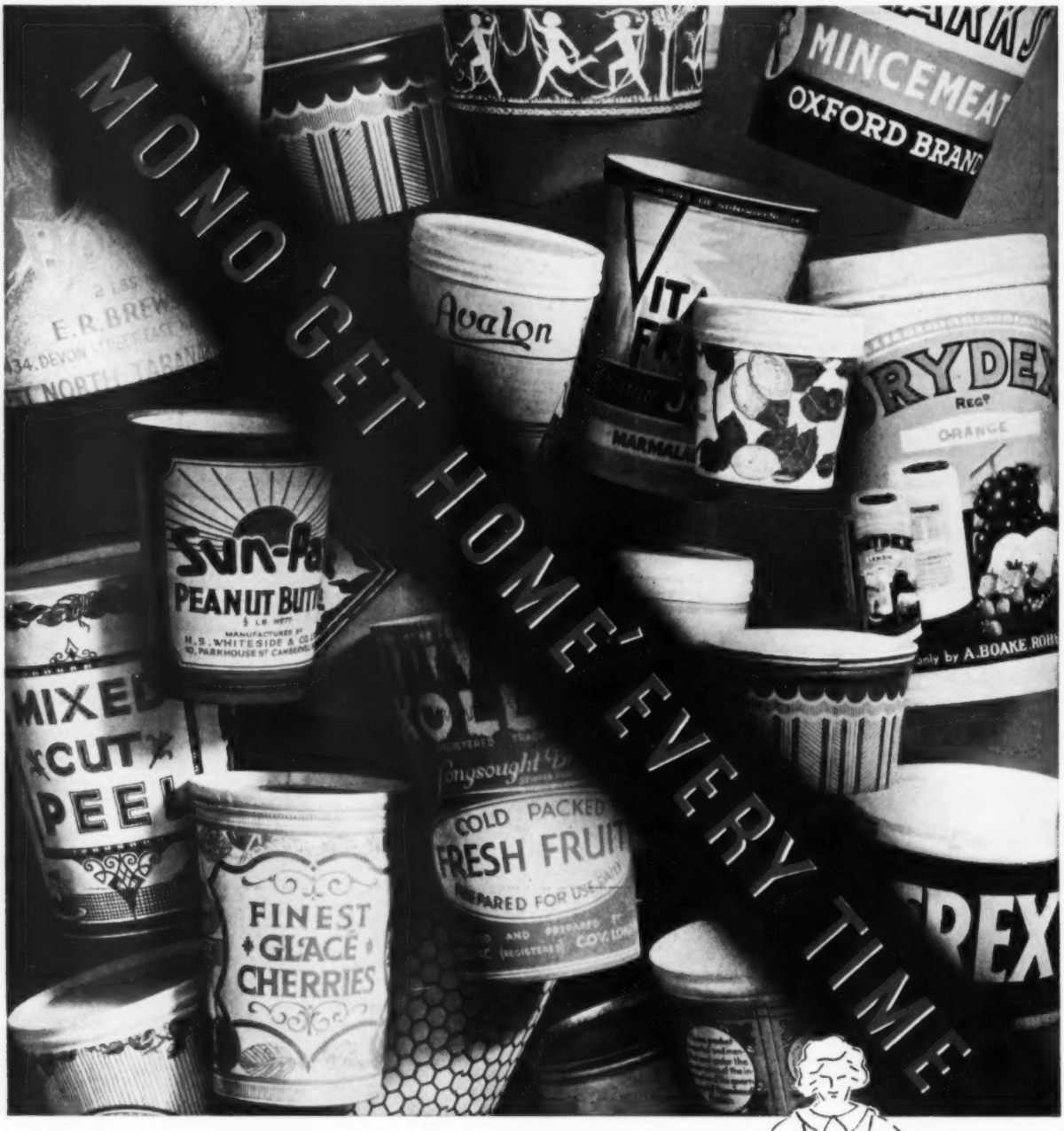


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# FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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# FOOD MANUFACTURE

Vol. XII, No. 3 March, 1937

## The People's Food

THE DIETARY Survey compiled by Drs. Cathcart and Murray for the Medical Research Council contains some very interesting facts about the food consumption at St. Andrews, Cardiff and Reading. One of the main points of interest brought out in an earlier investigation was the relative constancy in the distribution of calories between protein fat and carbohydrate eaten in different towns. Thus the percentage of protein eaten in St. Andrews was 11·03, in Cardiff it was 10·16 and in Reading 10·32. These figures were all the more interesting when it was seen how widely different were the types of foodstuffs eaten by these people. While 78 per cent. of the families in St. Andrews ate sausages, only 38 per cent. indulged in them in Cardiff. In Reading 94 per cent. of the population ate margarine, whereas in Cardiff only 57 per cent. took margarine. It seems evident from these reports that the constant percentage intake of the energy-bearing constituents shown by people who live far apart is obtained independently of the type of foodstuff eaten, and apparently is the result of some kind of instinct.

## The Canny Scot

The compilers of the Survey considered in detail the question of waste of foodstuffs by the average housewife, and have shown that in the St. Andrews families, at least, the conventional 10 per cent. allowance for refuse and waste is a big overstatement. The actual percentage of total calories of purchased food lost by the housewife as refuse and waste in St. Andrews was only 2·6 per cent., but the report goes on to say, " Whether the same care against waste is general throughout the country is doubtful ". In view of all the present talk on nutrition, it is interesting to note that the authors have concluded that few of the diets examined in these various towns, when considered from the standpoint of energy, protein, fat, etc., can be regarded as really poor. But, on the other hand, many of them, particularly with reference to their content of " protective " foodstuffs such as milk, green vegetables, and fruit, leave much to be desired.

## Educate the Housewife

The report lays very great stress on the need for educating the average housewife in the relative nutritive value of different foodstuffs by personal contact and by demonstrations in which the cooking utensils are those which the housewives have at command in their homes. It is, unfortunately, true that, even if there were abundant money for food expenditure in every household, ignorance and stupidity would often prevent the maximum nutritional benefits from being obtained, as they certainly do in many of the houses of the well-to-do at present. While this may account for a certain amount of malnutrition, undoubtedly the chief factor is lack of means to buy. This being so, an educational campaign is all the more necessary. The housewife with limited means must be taught how to use it to the best advantage. There are many stupid prejudices against certain foods which should be broken down. Margarine, for example, should not be regarded as a poor substitute for butter; it should rather be considered as an alternative to butter. In our view good margarine is better than bad butter any day. The same applies to canned foods, which are now produced in increasing quantities of the highest quality, and it is high time that the deprecatory " out of a tin " remark should disappear from common parlance.

## Soviet Nutrition

While civilised nations and individuals of the same nation differ considerably in their ideas of the best form of government, all are, or should be, united in a desire to improve the health of their own particular nation and in acceptance of the importance of adequate nutrition. Science approaches the solution of all problems with an open mind. Adherence to some particular creed should

not prevent an honest investigator from using the experiments of those who are probably of divergent political opinions. The contribution made by the U.S.S.R. to this vital problem of nutrition is described in a calm and scientific manner by F. Le Gros Clark and L. Noel Brinton in *Men, Medicine, and Food in the U.S.S.R.*, which they say is " an attempt to give in brief space a clear picture of the emergence and the development of Soviet health and food services ". The authors remind their readers in the introduction that the U.S.S.R. is in process of growth and transformation, and that only with this in mind can one see clearly what is happening there: " The interesting thing about a growing child or a growing civilisation is, in fact, its growth ". We might add that especially is this true if growth is along unusual lines, when all problems will necessarily be attacked from a different angle. Research workers know the value of that different angle.

From a study of the actual flow of food production from year to year the authors conclude that the U.S.S.R. is on the verge of a rapidly accelerating productivity. Communal feeding, with its elimination of waste, which was so necessary in the early days of extreme food shortage, may not survive the day of abundance, but it has aided food investigations on an unprecedented large scale. Among other research work, occupational surveys have been undertaken to ascertain the amount of protein or carbohydrate suitable to individual trades and professions. Curative diets have been studied and workers treated *en masse*, through specific diets, for tuberculosis, gastric and other disorders. Success is claimed by an increase in the working hours of the people treated. With such an enlarged outlook on the possibilities of nutrition cooks have thus become " the engineers of social feeding ".

## Irradiated Foods

The so-called irradiation of various foods was subjected to somewhat rough handling at the Academy of Medicine in Paris recently. It was suggested that " enterprising manufacturers have rushed in where scientists have been so many tender-footed Agags ". The irradiation of foods seems to have been carried to a much greater degree in France than in this country. There one can buy not only irradiated milk and flour in most shops, but also pastries, sugar, chocolates, and the like, all alleged to be stuffed full of all sorts of vitamins! We have frequently referred to the indiscriminate consumption of vitamins and the possible dangers to health by an over-indulgence in these substances. If, therefore, the articles sold in France do contain the active vitamins claimed, is there not a serious danger of going too far, as vitamins should only be administered on a doctor's prescription? If they do not contain the vitamins, they are just a common fraud. In this case it is difficult to say which of the alternatives is preferable from the public's point of view, but probably it is better to be robbed of one's money than one's health.

## Misleading Labels

The attention of all jam manufacturers should be drawn to an article by the Medical Officer of Health for Kensington in a recent issue of *The Medical Officer*. It is evident that labels on food do not always tell the whole truth and nothing but the truth. Labels should indicate the exact nature of the article labelled, but in the article referred to attention is called to the widespread use of labels which are calculated to mislead or deceive those who buy labelled food. Dr. Fenton described a subtle means of avoiding the dangers of the law by what he calls " collateral advertisement "—an extravagant puff in a newspaper, or a radio broadcast, which create the desire to buy, while the label, which the customer scarcely ever reads, may be moderate in its claims and legally safe. Jam is an article very liable to adulteration, and, although the Food Manufacturers' Federation and the Society of Public Analysts have issued standards, the Kensington authorities have found cases where second quality jam has been labelled so as to lead the customer to think that it is first quality. It has been said that no regulation has yet been framed that could not be got round by a clever, unscrupulous mind. It certainly seems true in this case. Moreover, as is pointed out in a communication on this subject published in *Food Industries Weekly* (February 13, 1937), there is a world of difference, for example, between " English Canned Tomatoes " and " Canned English Tomatoes ", but the housewife generally cannot detect it, and it is doubtful whether some retailers really appreciate the subtle difference.

## London Bread Prices

The Food Council has issued a Report to the President of the Board of Trade, dated January 27, with its recommendations regarding the price of the 1-lb. loaf in London. For some years past the two chief bakers' societies in London have charged,

on the average, 1d. per 4-lb. loaf more for bread sold in 1-lb. loaves than for bread sold in larger loaves. Though the Food Council have not approved of this practice, the reasons for it are well enough known to everyone. Now the Food Council have reconsidered their attitude, following discussion with representatives of the societies and of the Co-operative movement, who were in support of an increased charge. Accordingly, the Food Council propose to inform the Joint Price Committee that they agree that bread costs more to produce and deliver in 1-lb. loaves than in larger loaves. They agree also that the relative consumption of 1-lb. loaves has increased in recent years. They therefore have no objection to the proposal made to increase the extra charge to an average of 1¼d. per 4-lb. loaf, provided some advantage be given to customers who are prepared to fetch their bread from the shop, and that no increase is made where the Food Council's scale of bread charges is already exceeded. This seems to us to be a very reasonable arrangement. The Report is not being printed by H.M. Stationery Office.

## Joint Scientific Meetings

We have remarked on previous occasions in these columns upon the crowding of a number of interesting and valuable papers into one short meeting of about two hours or so, leaving little time for the development of discussion. International congresses of recent years have grown to such dimensions in the number of papers presented that real discussion is practically impossible. Usually those taking part in the discussion are simply presenting another, though rather shorter, paper appertaining to the main subject. At a meeting of the Food Group last year, when four papers were presented on the Estimation of Vitamins in one evening, the discussion took place only amongst the several authors of the papers. This was probably due to the relatively limited number of people engaged on work specially connected with the estimation of vitamins. Again, on a more recent occasion the Food Group and the Society of Public Analysts held a joint meeting, a report of which appears on page 89, when six papers were down to be read and discussed. This, by the way, is becoming a very enjoyable annual affair because it is arranged so that an informal dinner is taken, if we may say so, at half-time. The main subject of all the papers was work on the minor constituents of milk. But the point is that whilst those who attended may very well have digested the dinner, partaken, we hope, in an atmosphere of discussion of things unscientific, many must have suffered mental indigestion if they followed closely the papers read and the discussions. Six papers at one meeting is, we submit, too many, especially when they are devoted to one highly specialised subject. In any case, owing to time one paper had to be omitted.

This is but another indication of the trend of scientific development. Specialisation continues to be intensified as the amount of scientific work undertaken increases. As scientific work yields more accurate and conclusive results, more and more papers are available. Results are more precisely and clearly expressed. So the scope for discussion decreases, but the need for co-ordination between the different branches of science becomes correspondingly important. Joint meetings of different groups help in the interchange of knowledge and experiences. This form of joint scientific meeting should, we think, be extended, and if fewer papers were crowded into the time and more time allowed for discussion they would be much more profitable. With the much talked about co-ordination of chemical and scientific bodies the arrangement of joint meetings will, no doubt, be facilitated.

## Cheese Curds

An investigation has been concluded at the New York State Agricultural Experiment Station (J. C. Marquardt, Bulletin No. 670), in which the influences of salt and variations in cooking upon the composition and quality of five varieties of cheese have been studied. A rate for salting cheese curds based on the milk fat content was worked out, and the desirability of following a schedule of rates was indicated by the results. The study of variation of cooking added fundamental knowledge which will be useful in further investigations into cheese improvement. Variation in the cooking produced less variation in the quality of Cheddar cheeses than in the other varieties studied. Higher cooking temperatures were generally associated with a decrease in moisture and an improvement in quality of the cheese. The Camosun method of cheese-making did not give regular quality and uniformity in these experiments.

## Milk-Fruit Juice Mixtures

The milk bar development is acting as a stimulant to scientific research. In the January number of the *Transactions and Communications* of the Society of Chemical Industry, now published monthly, Dr. W. L. Davies, of the National Institute for Research in Dairying at Reading, describes

work on physico-chemical aspects of milk-fruit juice mixtures. This work follows on the work of Charley at the Long Ashton Research Station, and takes it a little further into the purely scientific field. Buffer curves of various natural and synthetic fruit juices have been found to be rectilinear over the *p*H range 3·5 to 6·8, the buffer indices being roughly proportional to the titratable acidities of fruit juices, whilst the titratable acidities in most part are due to the citric acid-citrate buffering system. The milk-fruit juice titration curve is logarithmic, and characteristic constants have been calculated for each juice for use when titrating milk. An equation is also suggested from which the *p*H of various milk-fruit juice mixtures can be calculated from the buffer index of the juice.

## The Future of Pigs

The recent collapse of the Pigs and Bacon Marketing Schemes makes one wonder what will be the ultimate end of it all. There can be no doubt that, if the industry is to become profitable, drastic changes are necessary. One of the causes of the failure of the last scheme was that it kept in being factories that, by reason of poor equipment, unsuitable positions, or other drawbacks, were uneconomical. That being so, it was impossible to produce large quantities of bacon without saddling the industry with unjustifiable overhead charges. We have maintained repeatedly that many of the English factories are obsolete and the methods out of date. It is absurd that we should have more factories than a big bacon-producing country like Denmark. It must be remembered that the housewife cannot afford to keep paying more and more for essential foodstuffs in order to maintain inefficient production. There comes a saturation point when an increase of, say, 1d. per lb. on bacon would result in the disappearance of the commodity from the housewife's shopping list and some substitute such as sausages take its place. We hope that neither the pigs nor the bacon board will be resurrected. There should be no division of the industry. The whole business from pig to bacon should be controlled by one body, and the Bacon Development Board seems to be the right one.

## Food Values of Canned Salmon

The more you pay for salmon, the more chance you have of getting vitamin A from it, is a conclusion drawn from work of G. M. Devaney and L. K. Putney, published in the *Journal of Home Economics* (U.S.A.). These authors studied the contents of vitamins A and D of various grades of tinned salmon. In increasing order of price the grades were: Commercial canned chum, pink, red, and Chinook salmon. The mean vitamin A contents were 0·28, 1, and 3·2 international units per gm. for the three lowest grades respectively, while two samples of Chinook salmon gave values of 4 and 8 units. The vitamin D contents were similarly regular in the three lowest grades, being about 2·3, 6·2, and 8 units; there was, however, a falling off in the vitamin D content of Chinook salmon, which yielded only 2·9 units. The authors expressed the opinion that canned salmon is a relatively inexpensive source of excellent protein. Added value is given to canned salmon by the fact that all varieties contain a considerable amount of vitamin D, and the better grades are rich in vitamin A.

## London Maligned

Our notice has been called to a recent issue of that admirable journal, *The London Mercury*, which contained an effusion by Mr. Ford Madox Ford, entitled "London Revisited". If one were inclined to take Mr. Ford seriously one might be genuinely perturbed by the sweeping indictment of London's food. But then Mr. Ford cannot be taken seriously. The opening sentence was enough to make us sit up and take notice. "The quality, the age, the condition, the appearance of the green vegetables and fruits displayed for sale in the London markets, and their paucity and lack of variety, are appalling." On the numerous occasions when we have traversed Covent Garden and many of the lesser markets that cater for London's millions we have always been impressed by the profusion and variety of vegetables displayed. Possibly Mr. Ford may know there are seasons for green vegetables, and it is impossible for every variety of the genus legume to be displayed at one and the same time. We have always felt that London's restaurants offer a greater variety of green vegetables than is the case with comparable European cities. We wonder whence Mr. Ford gets his information. Who told him that eighty per cent. of the food consumed in London comes out of cans? The canners would be very pleased if that were so. And really what does he mean when he says that most of London's food is "treated with preservatives mostly of pheno-phenyl origins"? Even playful mendacity should have some groundwork of truth—Mr. Ford's effort in this case, however, appears to be entirely the product of his own imagination.

# DANGER, GAS!

## Gas Warfare and the Food Manufacturer

by Ralph G. Harry, A.I.C., A.C.I.C., F.R.M.S.

*The effect of gas warfare on the food reserves of this country is a matter of paramount importance and cannot fail to be of interest to the Food Manufacturer, who is concerned from two points of view, the effect upon his personnel and the effect upon his food products.*

THE TERM "gas" as applied to warfare cannot be limited to its purely physical sense, but must include any chemical substance (gas, liquid or solid) which can be dispersed in fine particles. Tactically such gases may be divided into "persistent" gases—these usually being liquids which upon release over an area continue to dissipate vapours for a considerable period—and "non-persistent" gases, which on liberation are rapidly converted into a gas effective only until dispersed by natural elements such as the wind, etc. Distribution from the air, either by bombs or in the form of a spray, utilising possibly the exhaust pressure of the aircraft engine, is the method adopted.

In the following list, such gases as have been used, or are likely to be used, in warfare are classified under their main physiological effect, together with their possible effect upon certain foodstuffs. Possible chemical methods for their detection are given. It cannot be claimed that this list is complete.

### VESICANTS

#### Mustard Gas

Dichlorodiethyl sulphide $(CH_2Cl.CH_2)_2S$. This gas was the only one utilised in this group during the Great War. At low temperatures it is a white crystalline solid. Normally it occurs as a heavy viscid liquid, m.pt. 14·5°C.; b.pt. 217° C.; s.g. at 15° C.=1·28; volatility per cubic metre of air at 20° C.=0·6 g. Owing to its low vapour pressure it vaporises very slowly at ordinary temperatures and is therefore a persistent gas. It has a very insidious action, and contact with the liquid or vapour may attract no attention for some 6 to 10 hours, by which time it may be too late.

Its most important characteristic is its faint but definite odour, likened by some to horse-radish and by others to garlic, or onions. According to Buscher's investigations, mustard gas penetrates within 30 minutes uniforms (suits and underclothing), waterproofs, and leather, but passes more slowly through leather. Apart from a gas mask, the best protection is obtained by enclosing the whole body, including the head, in cloth which has previously been soaked in a strong solution of bleaching powder or potassium permanganate. The best preventive of skin erosion is chloride of lime, which may be applied either as a paste or dry. By this means serious damage may be prevented even up to 10 minutes after contamination. The dry powdered chloride of lime is best. Inflamed eyes may be bathed with 1 per cent. sodium bicarbonate solution.

Dry foods which have been contaminated with mustard gas may, according to Plucker, be treated by passing a current of warm air through, when it is removed fairly easily. If, however, the foodstuff contains much moisture it is rendered unfit for use. According to Spica (*Boll. Chim. Farmac.*, 1919, **58,** 361), it may be detected by sodium platino-iodide paper, which it at first turns a purple-red and finally blue. By passing the gas through sodium sulphide solution, diethylene sulphide (m.pt. 111° to 112° C.) is produced. Boulin and Simon (*Compt. rend.*, 1920, **170,** 845) have described a quantitative determination by titrating the chlorine with silver, working by the Volhard method, since silver reacts with thiodiglycol in neutral solution.

#### Lewisite

Chlorovinyldichloroarsine $(CHCl.CH.AsCl_2)$. This substance, which was isolated by the American Chemical

Warfare Service, has not yet been utilised for war purposes. It is a liquid, m.pt. 13° C., b.pt. 190° C., and possesses an odour which has been likened to geraniums. It is hydrolysed by water and alkalies and produces burns similar to mustard gas; the lesions, however, heal more quickly, unless they are extensive, in which case they may be complicated by arsenical poisoning.

Decontamination of foods contaminated with this material is difficult, as although it is fairly rapidly destroyed by water, it leaves a poisonous arsenical residue, and such food supplies should be condemned if chemical examination shows arsenic in amounts exceeding 1/100 grain per pound.

## LUNG IRRITANTS

### Phosgene Zusatz (Collongite)

This was one of the gases most widely used in the last war. It is very poisonous, even 2 to 5 ml. per cubic metre of air on prolonged exposure may prove dangerous to life; 5 to 10 ml. per cubic metre leads to serious irritation of the eyes and respiratory organs; whilst 20 to 25 ml. causes serious pneumonia after only a few minutes inhalation. In the Hamburg poisoning disaster of May, 1928, the bursting of a phosgene tank with consequent release of about 8 cubic metres of phosgene, led to 300 persons becoming ill and ten deaths. Blondes appear to be more susceptible than brunettes. Phosgene occurs as a colourless gas, fuming in moist air owing to hydrolysis, m.pt. −127° C., b.pt. 8° C. It is readily soluble in water, and is immediately decomposed into HCl and $CO_2$. In serious cases of poisoning death occurs from suffocation, and the victim may be "drowned" in his own blood plasma.

Phosgene and diphosgene are absorbed immediately by very moist foods, with consequent decomposition into HCl and $CO_2$. Fresh meat would be rendered uneatable by high concentrations of hydrochloric acid, although there would appear to be no inherent difficulty in washing this out with dilute soda if practised under careful scientific control. If, however, these gases were used in combination with such gases as $AsCl_3$ or $ZnCl_4$ then these would produce poisonous arsenic acid and stannic acid respectively, and the possibility of removing these by means of alkali would require investigation. It is possible that the gas, if present in small amounts in fatty foods, such as cheese, etc., might be removed by means of a current of warm air through the melted fat, although if large amounts were present neutralisation of the hydrochloric acid with alkali to produce sodium chloride, which might be leached out with water, might be carried out, *again under careful supervision.*

Phosgene, according to Delephine (*Bull. Soc. Chim.*, 1920, **27,** 283), may be detected by bubbling the contaminated air through KI solution with starch, when the precipitation of iodine leads to the formation of the characteristic blue colour. Kling and Schmutz (*Compt. rend.*, 1919, **108,** 773) utilise the formation of diphenyl urea (identifiable by its m.pt. 235° C.) by the passage of phosgene through cold saturated anilin solution. By filtering off and drying the diphenyl urea it is claimed that 0·001 volume per cent. is detectable. For large quantities the phosgene may, of course, be absorbed in water and the resulting HCl titrated.

### Chlorpicrin

$CCl_3.NO_2$. This substance is a liquid having a b.pt. of 112° C., m.pt. −69° C. It is persistent, and contaminated areas may remain dangerous for more than 12 hours. It is insoluble in water and has a s.g. 1·69 at 15° C. Although less toxic than phosgene it is a more powerful lachrymator. It has a cumulative action, and frequent exposure, even at low concentrations, may weaken resistance. Since it is capable of producing ulceration and conjunctivitis, it must also be regarded as a vesicant. It is comparatively stable chemically, but is decomposed by sodium sulphide. Its action is similar to that of phosgene, with the addition of vomiting. In post-war years it has proved of value as an insecticide and against rats, mice, etc.

The quality of flour and grain is not affected by it, although the germinating power of the grain is reduced (*cf.* Wille, *Z. ang. Entomologie*, 1921, **7,** 256). Foods containing large proportions of moisture, milk, meat products, etc., are rendered unfit for food if exposed to such vapour, but it may be removed from such foods as grain, coffee, cheese, lard, vegetables, etc., it is claimed, by exposure to a current of warm air.

Ssytschew (*J. Chem. Ind.*, U.S.S.R., 1930, **7,** 1168) has shown that it may be detected in air by its action on potassium iodide in methyl alcohol, whence it produces $CI_4$, KCl, and $KNO_2$, the latter two substances serving for its quantitative determination.

### Chlorine

During the early part of the Great War this gas was widely used. Leschke states that a chlorine content of only 1/20,000 in air produces incapability for fighting and a content of from 1/1,000 to 1/10,000 produces dyspnœa, cyanosis, and death.

Although more irritant to the respiratory passage than phosgene, a much stronger concentration is needed to produce severe pulmonary œdema. The onset of symptoms of poisoning is not subject to delay as is phosgene, and the victim conveys the suggestion of severe illness from the start. It occurs as a greenish yellow gas, of suffocating odour, and having a rather characteristic smell. The m.pt. is −102° C. and b.pt. −33·6° C., the density of liquid chlorine at 0° C. being 1·4.

Chlorine gas is soluble in water, and may be determined by the yellow colour produced on the addition of *o*-tolidine solution, this test being very sensitive. This reagent has the disadvantage that it also gives a colour if nitrites or manganous salts are present. However, nitrites and free chlorine do not co-exist in solution, and Harral and Jaffe (*Analyst*, 1932, **57,** 308) find that they may be distinguished by the starch-iodide reaction, since free chlorine will give a positive reaction in a solution even as alkaline as *p*H 9, whereas nitrites do not give a positive test if the solution is less acid than *p*H 4.

It is probable that foods containing little moisture, such as eggs, meat, fish, etc., might be washed with dilute sodium carbonate and the resulting chlorides leached out.

With more heavily contaminated foods, particularly in the presence of moisture, little treatment appears possible. If only slightly contaminated they might be rendered "passable" by vigorous boiling and treatment with small quantities of sodium carbonate. In either of the above cases chemical analysis must be made to ensure the absence of dangerous poisons such as arsenic and also of free acids, etc., and in view of the labour involved such methods are only likely to be used in case of an actual food shortage.

## SENSORY IRRITANTS

Substances in this class may be regarded as derivatives of arsine, $AsH_3$, in which the hydrogen atoms have been replaced by groups such as "phenyl" or "cyanogen".

Diphenylarsine chloride (Clark I.) and diphenylarsine cyanide (Clark II.) (Blue Cross) are two of the most effective irritants known. Clark I., however, is decomposed by water, and might be removed from certain foodstuffs in a manner similar to chlorpicrin. Clark II., however, is only slightly volatile and such methods would appear to be impracticable. Diphenylarsine chloride possesses a m.pt. of 45° C., s.g. 1·40, and is very soluble in water, with slow decomposition. Diphenylarsine cyanide, m.pt. 31° C., however, is insoluble in water and scarcely attacked by it.

The detection of arsenical compounds might be carried out on the lines already used for its determination in toxicology and food analysis. It has been suggested, however, that Clark II. might be determined by passing 10 to 15 litres of the air through a column of wadding (about 2 in. in length) in a glass tube, the wadding extracted with alcohol, evaporated to from 10 to 20 ml., diluted with an equal bulk of water, a little benzol added, and titrated with O.OOIN iodine solution (Sieverts, *Z. angew. Chem.*, 1922, **35**, 17). The iodine reacts quantitatively with the cyanide, excess iodine being observed by the colour of the benzol layer.

### Mixed Gases

The problem of gas warfare, however, is complicated by the fact that not only have new gases come into use in post-war years, such as diphenylchloroarsine, diphenylaminochloroarsine, and diphenylcyanoarsine to name only a few, but also mixtures of gases may be used, of which the following have actually been used in chemical warfare, such as trichloromethylchloroformate with phosgene and diphenylarsine, ethyldichloroarsine with dichloromethylether, and dichlorodiethyl sulphide with carbon tetrachloride and chlorobenzene.

These are quoted in order to show the extraordinary difficulty which faces any attempt rapidly to determine the composition of the gas used. During the Great War the Germans found only phosgene and dichlorodiethyl sulphide to be effective. The English are said to have used a mixture of chlorpicrin with 20 per cent. $SnCl_4$, the Russians sulphuryl chloride, whilst the Germans also used this with Perstoff (diphosgene) as "Green Cross".

### Lachrymators

If the object is merely to produce panic in the civil population lachrymators, as mentioned below, might be used. In small concentrations they cause watering of the eyes with smarting and pain. In higher concentrations the throat and nose may be affected and vomiting occur. Such cases, however, recover rapidly on removal from the affected area, and it is unlikely that these would be used except in conjunction with poisonous gases to increase their immediate effect.

| | *Formula.* | *M.pt.* | *B.pt.* | *Antidote.* |
|---|---|---|---|---|
| Acrolein | $CH_2=CH.CHO$ | − 88° C. | 51° C. | Alkalis |
| Benzyl bromide | $C_6H_5CH_2Br$ | − 4° C. | 198° C. | S. in NaOH |
| Bromobenzyl cyanide | $C_6H_5CHBrCN$ | 29° C. | 232° C. | Alkalis |
| Chloracetone | $CH_3COCH_2Cl$ | — | 193° C. | Alkalis |
| Xylyl bromide | $CH_3.C_6H_4.CH_2Br$ | — | 218° C. | Alkalis |
| Ethyliodoacetate | $CH_2I.COOC_2H_5$ | — | 150° C. | NaOH in glycerine |

It is assumed that the number of gases suitable for use is being enlarged year by year. The arsenical sensory irritants, being composed of particles, are not stopped by charcoal alone, and respirators require the addition of a suitable filter.

At least two other gases which might be termed "paralysing gases" which, although so far employed with little success, might with modern equipment for their application come once again into prominence—viz.,

Hydrocyanic (prussic) acid and
Sulphuretted hydrogen.

The respirator, however, gives a satisfactory protection against these. The decontamination of such infected material might, in the case of HCN, be accomplished by steam, provided the food was not too highly contaminated. When foods have been fumigated with HCN and then aerated, about 10 to 20 parts per million commonly remain, but the bulk of this is lost in cooking. For its estimation, a weighed sample of the food is distilled from a solution acidified with phosphoric acid, the evolved HCN being collected in dilute aqueous sodium hydroxide solution, and after addition of potassium iodide and ammonia, titrated with N/50 silver nitrate, according to Denige's method (*Compt. Rend.*, 1893, **117**, 1078).

### The Food Manufacturer's Problem

The main problem of the Food Manufacturer at present appears to be to secure the best protection for his food products. In general, it may be stated that the safest and probably ideal method is to seal them where possible in impervious containers (in cans or glass), this being particularly valuable for those foods containing large proportions of moisture. For the storage of foods which are not so protected the provision of underground warehouses equipped with adequate filtering appliances might be considered, such filters embodying the principles of a service respirator.

Where temporary protection of supplies is required (and this will cover the majority of cases) this is best accomplished by covering such stores with a thick layer of charcoal, or kieselguhr, both of which are powerful gas absorbents (except for certain arsenical derivatives), and both of which could be easily removed and after suitable treatment re-used.

The removal of easily volatile gases from contaminated foods containing only a small proportion of

(*Continued on page* 88.)

# TARO and its Fermented Product POI

by O. N. ALLEN, Ph.D.
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THE IMPORTANCE of fermented milks in the diets of the early peoples of South-Eastern Europe has been paralleled, if not surpassed, by the rôle played by fermented plant foods amongst the native peoples of the South Pacific Islands. Unfortunately, the nature of many of these plant foods has not frequented the scientific literature. The two most important of these are the "po'-poi" made from the breadfruit in the Marquesas and "poi" made from the taro in the Hawaiian Island group. Each of these foods has been influential in developing these native peoples, and has been justly called their "staff of life". The present discussion will concern the latter product, the plant from which it is made, and their possibilities as foods in our present time.

## The Taro Plant (*Colocasia esculenta*)

The taro, one of the best known of the edible aroids, is a member of the family Araceæ, to which also belongs the calla, the Indian turnip and the Elephant's Ear. The leaves are large and shield-shaped, and the underground stem, which becomes large and bulb-like, is commonly called a corm. About 300 distinct varieties of the taro have been described by Barret. Two general types are recognised from the standpoint of cultivation: one, a dry-land plant which has a growing season of 7 to 8 months and yields about 6 tons of corms per acre; the other, a wet-land plant which has a growing season of 7 to 14 months and yields about 12 tons per acre.

The dasheen, a variety of which the corm has recently attracted attention in the South-Eastern United States as possible substitute for the potato, is probably the best known of the Colocasias in the temperate region. The term "dasheen" is thought by Young to have been derived from the expression "de Chine", thus signifying that this particular variety came from China. However, Barret recognises as the only difference between the true taro and the dasheen the presence of small tuberous outgrowths on the corms of the latter. Data concerning the chemical composition of the taro and dasheen have been given by Chatfield and Adams (Table I., next page).

## The Fermentation of Poi

The food "poi" is prepared by allowing the crushed steamed corms of the taro plant to undergo an acid fermentation. In general, the actual manufacture of poi

A Hawaiian pounding Poi in the native manner. (Photo by courtesy of Hawaii Tourist Bureau.)

TABLE I.—COMPOSITION OF TARO, DASHEEN, POTATO, AND SWEET POTATO

| Crop. | Percentage. | | | | | | | | | Calories. | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Refuse. | Water. | Protein. (N × 6·25) | Fat. | Ash. | Carbohydrates (total difference, including Fibre.) | Fibre. | Sugar. | Starch. | Fuel Value. Per 100 grams. | Fuel Value. Per 1 pound. |
| Taro (corms and tubers) ... | 18·0 | 75·1 | 2·0 | 0·2 | 1·17 | 21·5 | 0·8 | 1·42 | 18·2 | 95·8 | 435 |
| Dasheen (corms and tubers) | 16·0 | 66·6 | 2·9 | 0·2 | 1·42 | 28·9 | 0·7 | 1·71 | 21·8 | 129·0 | 585 |
| Potato ... ... ... | 16·0 | 77·8 | 2·0 | 0·1 | ·99 | 19·1 | 0·4 | 0·87 | 14·7 | 85·3 | 385 |
| Sweet potato ... ... | 14·0 | 68·5 | 1·8 | 0·7 | 1·07 | 27·9 | 1·0 | 5·35 | 20·2 | 125·1 | 565 |

consists of two major processes: (1) the cooking, peeling, and grinding or pounding of the taro corms; and (2) the incubation and fermentation of the crushed product. In the native manner the taro was cooked in a kiln in the ground, after which the corms were peeled. Pounding the corms took place in a hollowed-out wooden tray with a stone in the shape of a thick and clumsy pestle. Water was added until the paste became an adhesive, dough-like mass (Plate I.). The mash was then placed in calabashes or gourds, diluted to the proper consistency with water, and set aside for fermentation. It was preferred by the natives when four or five days old.

In the present-day process the taro is loaded on large carts, covered with tarpaulins, and conveyed into a hooded enclosure, into which steam is injected for several hours. Following the cooking, the corms are washed with rapidly flowing water, during which process the outside peelings are removed with ease. Further peeling, trimming, and scraping serve to clean the corms. Immediately thereafter they are ground in a machine, and the mash or paste is mixed with water (to approximate 30 per cent. by weight of solids), and incubated at room temperature (25° to 30° C.). Prior to the mixing of the paste with water it is known as *paiai*, a product which undergoes little, if any, fermentation. It was this concentrate which the Polynesians carried with them on their long voyages as reserve food. After the addition of water, paiai becomes known as poi.

Fermentation of poi begins several hours after the addition of water, and becomes evident by the changes in texture, colour, and consistency. In the first phases of the fermentation—*i.e.*, beginning soon after the water is added and lasting for six hours—the paste undergoes a slight puffing very similar to the rising of bread. During this period a cosmopolitan flora of micro-organisms is present, including such common water and soil forms as *E. coli*, *A. aerogenes*, *Ps. fluorescens*, and various species of chromogenic bacteria and yeasts. Between the sixth hour and including the fourth day this flora becomes conspicuously absent, and the microflora becomes predominantly acid-producing forms, the most common of which, and incidentally those being responsible for the fermentation, are: *Lactobacillus pastorianus*, *L. delbrückii*, *L. pentoaceticus*, *Streptococcus lactis*, and *S. kefir*. It is during this period of the fermentation that the product is the most palatable to many tastes and possesses the most acceptable fruity aromas and flavours. In the poi made from the most favoured variety of taro, known by the native name *piialii*, the fermentation may be followed by noting the change in colour from blue to pink, a change due to the presence of a litmus-like indicator which is a constituent of the corm. During this period of the fermentation the hydrogen-ion concentration increases from about *p*H 6·0 to *p*H 4·2. After the fourth day of incubation the macroscopic changes due to fermentation are slight. The acid-producing organisms become less important, while the acid-tolerant yeasts, mycoderms, and oidial species become increasingly prevalent. It has been shown that the various micro-organisms concerned in the fermentation gain entrance to the poi as a result of insufficient heating and cleansing of some of the corms, as well as by the use of vessels which have held previously fermented batches. In general, the fermentation is normal—*i.e.*, a lactic one. When abnormal fermentations do occur they are of a butyric type.

According to Bilger and Young fresh or zero-hour poi has the following chemical composition:

| | Per Cent. | | Per Cent. |
|---|---|---|---|
| Moisture .. .. | 68·30 | Proteins .. .. | 0·31 |
| Starch (takadiastase) .. .. | 27·00 | Fat .. .. | 0·07 |
| Pentosans .. .. | 1·30 | Crude fibre .. | 0·39 |
| Reducing sugars .. | 0·50 | Ash .. .. | 0·46 |
| Sucrose .. .. | 0·03 | Phosphorus .. | 0·057 |
| | | Calcium .. .. | 0·018 |

As fermentation progresses the reducing sugars are utilised by the micro-organisms as sources of energy. Hydrolysis of starch begins on the second day and continues until the eighth day. The acids formed are lactic, acetic, and formic, the latter two being present in small amounts. Only traces of alcohol and acetaldehyde are found during the fermentation, while appreciable quantities of carbon dioxide are evident from the initial stages. Thus the fermentation of poi bears a close analogy to that of the sour milks in the types of organisms concerned and in the nature of the product.

## Nutritive Value of Poi

Although poi does not occupy at present the prominent place it once had among the food of the peoples in the

Pacific area, it has become by no means rare. This is evidenced by the fact that the production of the largest of nine factories in the city of Honolulu approximates 9,000 lb. per day. Its use as a hospital and infant food will probably serve to maintain its standing in the accepted food lists. Recently conducted tests with poi as the basic constituent of the diet of under-nourished children of plantation workers have shown its excellent qualities as a teeth-building and health-giving food.

One needs only to turn the pages of Hawaiian history to respect its former place of prominence. Thrum in 1879 was probably the first to attribute the marvellous physical development of the Hawaiian to this food. Whether or not the absence of a word for "indigestion" in the Hawaiian language can be attributed to the good qualities of poi is probably debatable.

The earliest scientific explanation for the easy digestibility of the taro was that of MacCaughey, who, in 1917, based this characteristic upon the small size of its starch granule (1 to 3 micra). Langworthy and Holmes have shown that 98·88 per cent. of the starch was digested when humans were employed in experimental tests. Further studies also showed that no undigested starch appeared in the fæces even when 250 gm. of taro starch were eaten in one day. According to Steenbock and Gross the dasheen is a fair source of vitamin B, but devoid of vitamin A. Recently Miller found that both taro and poi contained vitamin A, a lesser amount in poi than in taro. Miller also noted that taro and poi supply about half as much vitamin B as do the whole grains, including the embryo, and about twice as much as does milk. Vitamins C and D were not found in any appreciable amounts. Her results also seem to warrant the conclusion that persons subsisting principally on poi, supplemented with raw fish and small quantities of other foods, are able to supply their needs for calcium and phosphorus satisfactorily.

### Commercial Possibilities

It seems logical that a perishable food such as poi, with its low cost of production,* its unique flavour, and high nutritive value, should have excellent possibilities as a canned product. Recently attempts along the line of canning have been undertaken by the Hawaii Agricultural Experiment Station of the University of Hawaii. Tests conducted by the author in the Laboratory of Bacteriology, University of Hawaii, have shown that poi at various stages of the fermentation may be sterilised without difficulty, with the result that the tinned product retains the taste, aroma, and flavour of the fresh. Much would be needed to be done, however, in educating the general public to accept poi as an everyday food. Whether this could be done with sufficient advertising remains a commercial problem.

Canning of the undiluted mashed corms or *paiai* seems a plausible venture, since the nutritive value of the taro is retained in a product which is not acid or objectionable to many tastes. This also has possibilities as a sandwich spread which, if a slight fermentation were induced, would be comparable to a mild cheese product. The taro, cooked and canned as are yams and sweet potatoes, also appears to be a promising venture. Substitute of the freshly cooked taro corms for potatoes is not uncommon now in various areas. Taro chips or flakes have appeared on the market on several occasions, but in spite of their having met the consumers' favour they have not continued to be available.

Various attempts have been made to manufacture and establish a market for taro flour. *Taroena* and *Taro Mano* were the best-known brands. Taro flour pancakes and breakfast muffins are at present one of the menu specialities on many passenger ships en route to South Sea ports. The use of the flour *per se* for baking purposes may be a bit impractical, yet its possibilities as a blend with other flours are not without promise. At one time a product called *Taro Maloo*, closely resembling macaroni, was introduced and met with favour. It appears that in many of these commercial ventures the lack of capital and the desire to accrue immediately a huge profit were responsible for the withdrawing of the products from the market.

The entire taro plant has served as a source of food in many of its habitats. In Guam and the Hawaiian islands the large leaves are prepared in much the same manner as spinach. Cooked taro corms mixed with rice, or sprinkled with coconut, are common dishes among the Javanese, according to Ochse. It is worth while to remember that the roots, stems, and leaves of the taro cannot be eaten raw because of their irritating effect upon the mucous membranes of the mouth. This irritation is attributed to the calcium oxalate crystals present in capsules in the plant cells. This is not a serious objection, however, since the capsules lose their ability to expel the crystals after the plant parts are cooked or dried.

It is hoped that the possibilities of the taro plant and of poi will be realised and gain more widespread favour as Man continues his search for newer and better food products.

* Fresh poi sells at a retail price of about 25 lb. for four shillings.

For further details the reader is referred to:

Allen, O. N., and Allen, E. K., 1935. "The Manufacture of Poi from Taro in Hawaii: with Special Emphasis upon its Fermentation," *Hawaii Agricultural Experiment Station Bulletin* No. 70. 32 pages.

Bilger, L. N., and Young, H. Y., 1935. "A Chemical Investigation of the Fermentations Occurring in the Process of Poi Manufacture," *Jour. Agric. Res.*, vol. 51, pp. 45-50.

## NITROGEN TRICHLORIDE in the FRUIT INDUSTRY

NITROGEN trichloride is now in use commercially in California for the prevention of decay in citrus fruit. The gas kills the spores on the surface of the fruit, but does not destroy the mycelium after it has once penetrated into the inner portions. It will penetrate the wrappers of a packed box of fruit. Apparatus for the safe production of the gas in dilute concentration in air and for its application within storage rooms and refrigerator cars has been developed.

# The B.I.F. and the FOOD MANUFACTURER

## Olympia and Birmingham Exhibits under Review

### LONDON: EXHIBITS AT OLYMPIA

THE OLYMPIA section of the British Industries Fair contained the exhibits of the lighter industries of the United Kingdom and the products of the Dominions, India and the Colonies. As was to be expected, the influence of the forthcoming Coronation was very evident. It furnished the keynote of the decorative scheme in both the Grand Hall and the National Hall.

Broad strips of bunting, red, white and blue, bedecked the roofs and walls, with the Royal monogram and other appropriate emblems at frequent intervals. These colours were also used for the huge chandeliers, one in the middle of each hall. The new Empire Hall was painted in white and green and its three tiers of wide galleries were reached by escalators, a new and modern convenience which added greatly to the comfort of exhibitors and visitors.

The number of exhibitors showed an increase as compared with last year's Fair, but the number of new products and unusual features of interest to the food manufacturer was not very great. In general, manufacturers appeared to have concentrated on the production of their well-known and tried lines with minor developments and improvements. On a number of stands the exhibitors volunteered the information that they were so busy in meeting the demand for their established products that they were unable to devote time to the development of new lines.

#### The Empire Section

The principal exhibits covered by the term "foodstuffs" were to be found in the Empire section. This section gave an excellent impression, the stands being arranged attractively and the range of Empire produce displayed exceptionally wide. Typical Australian produce such as wheat, sugar, canned fruit, eggs, cheese, honey, frozen meat and dried fruits were displayed, as well as apples and oranges kept in cold storage especially for the Fair. An unusual feature of the Irish Free State exhibit was canned butter specially packed for use in hot climates.

A special feature was made of fresh deciduous fruits on the South African stand, while the Newfoundland Government drew particular attention to the fishing industry, both fresh water and sea water. Typical New Zealand produce such as butter, cheese, mutton and lamb were attractively shown on the New Zealand stand, and a little booklet was displayed explaining exactly what the New Zealand brand mark actually implies. Rhodesian maize and glucose, which renders sweets and "soft" drinks wholesome, were among the exhibits of Southern Rhodesia. Coffee, tea and bottled granadilla juice were displayed by H.M. Eastern African Dependencies, while the Government of India stand showed the wares of about 50 exhibitors, including many types of food products such as chutneys, spices, cashew nuts, cereals, tea and pickles.

The Ministry of Agriculture and Fisheries stand drew attention to the wide range of home-grown fruits and vegetables now being canned and bottled. In the Canadian section the range and variety of products shown were almost bewildering. A number of Canadian firms were showing their own produce—for example, *Shirriff's, Ltd.*, of Toronto, makers of table jellies—and in addition to the Government's own display, 27 civic and industrial exhibitors showed their wares. Among other Empire countries having displays were Jamaica, showing oranges and ortaniques, a cross between an orange and a tangerine, and Cyprus, showing oranges and lemons and Cyprus wines.

#### The Foodstuffs Section

The Foodstuffs Section proper was again small in comparison with most of the other sections. A new product, "Salu-cose", which is a stabilised fruit juice containing an equal amount of fine fruit juice and glucose of B.P. standard quality, was displayed by *R. G. Booth*. Morelto Liquid Chocolate was again presented by *Chocolate Products Co., Ltd.* It can be used for hot and cold drinks, table delicacies and bottled chocolate drinks (still and aerated). Quality chocolates of different grades for hotels, etc., in boxes bearing the customer's own name were shown by *Overton's Chocolates, Ltd.*

#### The Chemical Section

This section occupied the same position and about the same amount of space as last year. The number of exhibitors was less, however, so that the amount of floor space between the stands was greater. The dwindling in the number of exhibitors in this section and its smallness as compared with other sections, such as the leather goods section nearby, does not give a good impression of the extent of the British chemical industry. This must be particularly noticeable to those coming from abroad and who are accustomed to visiting German fairs. The chemical section, in fact, appears to be out of place in that it is surrounded by sections displaying finished goods for the retailer, while the chemical section itself is primarily interested in supplying the manufacturers.

*A. Boake, Roberts and Co., Ltd.*, had a very attractive display of their many essences and flavourings for mineral waters, confectionery, baking, table-jellies, ice-cream, milk, jams, vinegar, sauces, etc. Food colours and food preservatives, which are all guaranteed to conform to the legal regulations in force in this country, were also shown. A full range of their products, including fruit essences, natural fruit extracts and harmless food colours, were shown by *W. J. Bush and Co., Ltd.*, on a well-designed stand. A new product, *d*-Sorbitol, which is a sweet carbohydrate of high food value for diabetics, was shown by *Howards and Sons, Ltd.*, as well as *d*-Mannitol, of foodstuff quality, which is being manufactured for the first time in this country. This firm have also just

put on the market for the first time in this country Calcium Gluconate, which is used in foodstuffs and for medicinal purposes. *Monsanto Chemicals, Ltd.*, showed a wide range of their products, including disinfectants, preservatives and high-power germicides; while of particular interest to the food manufacturer were Vanillin Monsanto, which is extracted from clove oil, and Ethavan, which is a super-vanillin.

The stand of *Whiffin and Sons, Ltd.*, had two alcoves devoted to oils such as almond, caraway and clove. There were also a group of Gelozone preparations, which are well known as stabilisers and emulsifiers for ice-cream, fruit squashes, sugarless jams, mayonnaises, soups, etc. *The British Drug Houses, Ltd.*, showed various vitamins and vitamin preparations as well as standard methylene blue milk-testing tablets. *Williams (Hounslow), Ltd.*, displayed a wide range of their harmless edible colours, the *Distillers Co., Ltd.*, various grades of alcohol, yeast and malt extract, and *B. Laporte, Ltd.*, acid sodium pyrophosphate, which is extensively used as an aerator by confectioners.

The *Imperial Chemical Industries, Ltd.*, exhibit was in the form of a bureau for inquiries, while special photographic showstands illustrated how various I.C.I. products enter different industries.

### General and Paper, Printing and Stationery Sections

These sections contained the principal suppliers of packages and packaging materials. A wide range of wax impregnated, moisture-proof, grease-proof, hygienic containers for manufacturers of foodstuffs, confectioners and makers of other perishable goods were shown by the *Pearlite Box Co,, Ltd.*, and a comprehensive range of stave-built casks and plywood kegs were shown by the *Guelph Cask, Veneer and Plywood Co., Ltd.* The former should be of interest to food manufacturers generally as, in comparison with plywood kegs, the casks are said to be free from odour.

Boxes, cartons, showcards, etc., made from materials to which transparent cellulose film has been affixed by the Celilynd process were shown by *British Celilynd, Ltd.* New developments in the process have made it possible to produce boxes in two or more colours, while progress has also been made in printing on celilynd as opposed to printing on the board before processing. Cake bags with a transparent window, the "Photo Colour bag", printed in photogravure and two colours were among the exhibits of *John Dickinson and Co., Ltd.* A new development is the production of a stock printed wrapper for Swiss rolls and a special bag for packing dressed poultry. Greaseproof paper for wrapping foodstuffs and Sidac moisture-proof transparent viscose paper were shown by *Wiggins, Teape and Alex. Pirie (Sales), Ltd.* Heat-sealing moisture-proof "Diophane" is again the special feature on the stand of *Transparent Paper, Ltd.* The usual range of colours are shown and the demand from all parts of the world continues to increase. Tinted corrugated paper and greaseproof corrugated paper were shown by *Corrugated Packing Materials Co., Ltd.*, and embossed gummed paper seals, including Coronation seals, by *Livermore and Knight, Ltd.*

### The Scientific and Optical Instruments Section

A wide range of scientific and optical instruments were displayed in this section. *Bellingham and Stanley, Ltd.*, showed a selection of polarimeters, saccharimeters, and refractometers. *Hanovia, Ltd.*, showed ultra-violet light equipment used for fluorescence testing, and *The Tintometer, Ltd.*, various instruments for measuring and recording colour, the B.D.H. Comparator and B.D.H. Capillator for the determination of *p*H values, and the B.D.H. Lovibond Nessleriser and Limitester.

### Miscellaneous

Bottles and jars for confectionery and display purposes were shown by *Jackson Bros. (Knottingley), Ltd.* For the first time a Government trading estate, designed to attract industry to the Special Areas, exhibited at the Fair; the *North-Eastern Trading Estates* showed a 50 square feet model of the Team Valley Estate, with miniature factories, roads, railways, trees and gardens as they will appear when the estate is fully developed. A 9,600 square feet factory is now being built on the estate for Havomor, Ltd., food manufacturers. Electric time recorders which aid economic production planning were shown by *Smith's English Clocks, Ltd.*, and *Sozol* (1924), *Ltd.*, showed their Oteg egg preservative, which is now being used in many countries.

## THE BIRMINGHAM EXHIBITS

Housed in one gigantic building, the Birmingham Section of the British Industries Fair becomes every year more stupendous. It has grown each year from 1920 until from end to end the building is now more than half a mile in length. Though the exhibits are arranged in four great groups—Hardware, Building, Gas, and Engineering—the classified list of exhibitors contains no less than 1,300 different headings. It is impossible, therefore, to describe the exhibits in each group, but only to select those of outstanding interest to the food manufacturer. There is no doubt that anyone visiting this branch of the Fair must find a tremendous number of exhibits worthy of close study in connection with the design and layout of factories, materials for plant construction, process control and so forth.

### The Modern "Ice-cream Cart"

A travelling milk bar exhibited on the stand of *R. A. Lister and Co., Ltd.*, comprises a Lister auto-truck fitted with a specially designed refrigerator and bar carrying all the necessary apparatus made by Controlled Cooling, of Shell-Mex House, London, who are responsible for the whole development. Jars of fruit juices, all rubber mounted to reduce vibration to the minimum. It carries 16 gallons of milk, ice-cream in a separate container, and even a cash register. The whole is covered with a canopy under which the driver-cum-barman can sit to drive or serve the drinks. This novelty of the show is designed to take milk drinks anywhere for any occasion, and its introduction should increase the consumption of milk and the ingredients of milk drinks.

### Tasteless and Odourless Belting

*J. H. Fenner and Co., Ltd.*, of Hull, are responsible for the production of the Z "Swift" belting, which is tasteless and odourless, and is now being used in several food factories for biscuit, chocolate and confectionery conveying.

### Weighing Machine Developments

The newest *W. & T. Avery* productions on show was their continuous weigher for liquids. Any amount up to 1,000 lb. can be weighed very rapidly by this machine, which comprises two containers into which the liquid is filled and weighed alternately, running out of one whilst the other is being filled. Large visible weigher scales indicate the accuracy of the weighing. The machine is designed for handling milk and is constructed of stainless steel and grey vitreous enamel. It is very accessible and any change in the amount to be weighed can be made very quickly.

A fraud-proof weighing machine which prevents errors being made by the operator and keeps a record of every lot weighed, and a machine for determining the pound per bushel of grain, were two other new items applicable to food manufacture exhibited by *W. & T. Avery, Ltd.*, this year.

A crane weigher (not a machine to weigh a crane!) by which loading and weighing is accomplished in one operation was shown by *Salters* of West Bromwich.

### New Four Roll Flour Mill

An outstanding example of the latest product by *Henry Simon, Ltd.*, is their improved flour mill. The rolls are driven by satellite gears which give constant tooth mesh whether the rolls are opened or closed. It is thus possible to use a finer pitch which gives smoother running and longer life. The large hand wheels have been eliminated, making the regulating gear less conspicuous. The rolls can be adapted for water cooling, and the machine can be utilised for grinding and crushing most varieties of cereals and grains. All exterior fittings are rounded to give a clean, smooth finish.

### Powder Mixing

Another exhibit of interest on the Henry Simon stand was their novel spray type vertical mixer, which works on an entirely new principle. The material is first spread evenly over a shelf by means of stirring arms, and then falls through slots, entering the main mixing chamber in the form of a spray, where it is stirred with rotating steel arms. A vertical worm conveyor takes the material away continuously from the bottom of the mixer and feeds it to the top spreading shelf for further treatment. It is not continuous in operation and can be obtained in four capacities, from 5 cwt. to 2 tons.

### High Efficiency Air Separator

*The British Rema Manufacturing Co., Ltd.*, are well-known makers of air separators. They have now developed a high efficiency machine for the separation of powders of heavy or light weight materials working at low power consumption. The machine embodies their own patented principles of multiple spinner discs over which the material descends in a helical film of great length, whilst the air ascends, taking with it the fine particles. The fineness can be easily adjusted by controlling the velocity of the ascending air stream. There are twelve standard sizes. The separator is fed from a hopper above and is self-contained. Through-put in tons per hour varies according to mesh from 0·08 to 0·43 for the smallest to 2·75 to 15·0 for the largest.

### Metals and Plant Materials

*Samuel Fox and Co., Ltd.*, exhibited, among many examples of work in their Silver Fox stainless steels, a cheese vat made by Metal Propellers, Ltd. F.M.B. Staybrite is the latest variety of *Firth-Vickers* stainless steel, produced for extra corrosion-resistance. It contains molybdenum and is equally as workable and weldable as the F.S.T. variety. *Johnson Matthey and Co., Ltd.*, were again exhibiting examples of solid silver plant as well as piping in silver-plated or silver-lined copper. Samples of "Meldrum" acid-resisting metal were obtainable from the *Meldrums, Ltd.*, stand, on which were also shown examples of steam jet apparatus, stills, water heaters, etc., in a variety of metals.

### Thermostatic Control

The *British Thermostat Co., Ltd.*, were offering two new devices, a range of "Teddington" hydraulically operated motorised valves for controlling the flow of steam, water, refrigerants, liquid or gaseous fuel under thermostatic conditions, and a room-type thermostat of the bi-metal type. The former are applicable to the control of processing plant and the latter for regulating room temperatures.

### Compressors and Vacuum Pumps

Whilst the range of working compressors and vacuum pumps made by the *Northey-Boyce Rotary Engineering Co., Ltd.*, showed expansion from those machines exhibited last year, they were able to announce that a range of two-stage compressors of 120-240 cu. ft./min. capacity up to 120 lb. per sq. in. pressure and 300-600 cu. ft./min. capacity up to 90/100 lb. per sq. in. pressure will shortly be put into production. Applications of their machines in the food industry include agitation and aeration of milk, beer, cooling of cheese and semi-fluid products, moving liquids and powders by pressure, moistening and aerating powders, etc.

### Dust-Free Air

The new Versil replacement type air filter should be of immense interest to food manufacturers who require conditioned air free from dust in their factories. Its design is based on two well-known filtration principles—the adhesive properties of a wetted surface and the deposition of impurities by the change of direction of air flow. Glass fibre covered with an adhesive is packed into light, open metal frames which are fitted into the air-conditioning unit and can be easily replaced when filled up. They offer extremely low air resistance for high dust collecting efficiency over long periods. They are also claimed to be glow- and moisture-proof. They are made by *Versil Ltd.*

(*Continued on page* 93.)

# Enzymic Clarification of FRUIT JUICES

by VERNON L. S. CHARLEY, B.Sc.
(Agricultural and Horticultural Research Station, Long Ashton, Bristol)

THE MODERN manufacturer of liquid or solid food products is making more and more use of fruit grown in this country, and the processing of the raw material has given rise to certain difficulties associated with the clarification of the fruit juices. Every effort is now being exerted to provide fruit products and fruit-flavoured foods in which the fresh flavour of the fruit is as prominent as possible in the finished product. It is natural that the processing of fruit into liquid products other than those of a cloudy nature (such as squashes) must result in a brilliant syrup or other liquid product, and in some other cases, too, it is important that the primary material treated in the actual food processing, which is generally a fruit juice, should be clear. This is the case when jellies containing fruit juices are being manufactured, and the clarification of such juices is often a most difficult procedure. If any appreciable heat treatment has been applied to the raw material or to the unfiltered juice it is probable that a considerable separation of mucilaginous material will thereby be effected, but if it is considered desirable to avoid the use of heat in any way, then the removal of the colloidal constituents of the juice must be effected in some other way. Works chemists whose problems bring them into contact with fresh fruit material are only too well aware of the difficulties caused by the appreciable presence in the fruits and their juices of highly complex chemical compounds of widely differing constitutions. Added to this are the variations of these materials with many uncontrollable conditions—*i.e.*, weather—and the often very rapid changes which take place in their composition when the fruit passes through various stages of ripening. Prominent amongst the classes of compounds which are responsible for a part of the difficulty of filtering and stabilising fruit juices are the pectins and proteins. Fruit juices vary considerably in their content of these types of compounds; in general, the pectins are present in much greater quantities than the proteins, but whereas the changes in pectinous substances take place at a rapid rate during the later ripening stages, often resulting in a loss of total pectin, the total nitrogen content remains practically constant. Although the original enzyme process for clarification patented by Wallerstein in U.S.A. in 1911 for the clarification of beer wort concerned the removal of nitrogen by a proteolytic enzyme, the chief developments since that time have taken place in the realm of pectin chemistry. A number of enzyme preparations, which have no single specific effect, but are rather to be considered as a mixture of various enzymes each having its own specific effect on definite types of material, have been used abroad with some success. Specific proteolytic and pectin-decomposing enzymes are also obtainable.

*The modern manufacturer of liquid and solid food products is making more and more use of fruit grown in this country, and the processing of the raw material has given rise to certain difficulties associated with clarification of juices. Mr. Charley describes the latest results of work carried out at Long Ashton and the overcoming of these difficulties using enzyme preparations.*

## Proteolytic Enzymes

The writer has used and reported on[1] a material supplied from Germany and known tentatively as "Maltolysin". This is a proteolytic enzyme which, from the point of view of fruit juices, is unfortunately fixed on a base of malt extract. This base is liable to impart a taste to the juice, and, in some cases, to supply sufficient nitrogen in an assimilable form to the yeasts for a sudden commencement of fermentation to ensue. Remarkable clarification was obtained by the use of a concentration of 0·01 per cent. maltolysin (40 gm. to 100 gallons) with a mixed culinary apple juice. The apples had been grown under cultivated (ploughed) conditions, and it is well known that such fruit contains much higher percentages of total nitrogen than fruit grown under grass. The juice was completely clarified in 17 hours, and was filtered with perfect ease through paper without recourse to pressure. The enzyme material, however, has not given such clear-cut effects with cider fruit juices where the nitrogen content is very low (0·008 to 0·1 per cent.).

## Pectin-decomposing Enzymes

The presence of naturally occurring enzymes which were capable of effecting changes in the pectin compounds of biological materials has been known from the time of Fremy, who was one of the first scientists to study the specific changes undergone by the pectin compounds in fruit and vegetables. But in many cases the naturally occurring enzyme was unable to effect completely the necessary changes, and a search for other means of removing the pectin from colloidal or true solution was commenced. The recent phase of development

dates from the publication by Willaman and Kertesz in 1931 of a Technical Bulletin from the New York Agricultural Experiment Station describing an enzymic method for clarifying grape juice.[2] This was followed by a method for apple juice, and the enzyme was then commercially prepared both in America and Germany. Pectinol, the enzyme in question, went through a "series of editions", Pectinol B succeeding Pectinol A until Pectinol E, representing the most potent form of enzyme material in the series, was reached. The enzyme is fixed on an inert base, such as bran or pollard, and this dry powdery base is stirred into the fruit pulp or juice. The action is stated to be twofold, a direct precipitation of part of the pectin, and a degradation and solubilising of a further portion. Satisfactory results have been reported from America, and the material has been extensively tested out at Long Ashton. In many cases juices which could never have been filtered in a fresh condition were readily filtered to a brilliant consistency after 24 hours' enzyme treatment. The best results were obtained with the lower acid fruits, such as strawberry and, to a less extent, raspberry and plum, and a slight but definite removal of pectin was shown by actual chemical analyses to be associated with the use of the enzyme on the more highly acid fruits, loganberry and black currant. In the earlier Long Ashton experiments the enzyme was added to the juice which had been expressed from slightly fermented fruit. During the next season the base was stirred into the milled fruit pulp. (It is an advantage to make the powder into a thin mash with some juice and maintain this at a temperature of 100° F. for 12 hours before the fruit is ready for treatment.) The results were again definite and important. The decomposition of the pectins dispersed the slime and thinned down the material to such an extent that the "cheeses" could be built and manipulated with ease and accuracy and the pulp pressed with greater efficiency and economy than in the case of untreated pulp.

**Enzymic clarification of strawberry juice. Jar No. 1 treated with 0·3 per cent. filtragol; jar No. 2 treated with 0·5 pectin decomposing enzyme; jar No. 3 control, no treatment.**

A further commercial enzyme for the removal of pectin has recently been introduced into this country by the German firm of Bayer. "Filtragol" has now been tested by a number of research stations in Germany and Switzerland, and at Long Ashton the writer has been fortunate in observing its effect on very large-scale experiments involving the use of some 20,000 gallons of pure fruit juices. Zimmermann and Malsch[3] found that the yield of juice from blackberries was increased from 52 to 73 per cent. by the use of the enzyme preparation. A further effect noted by other workers where Filtragol was used with freshly milled black currants was the considerable solution of colour from the skins by the juice. This effect is of some importance, for the very characteristic colour of black currants is difficult to reproduce exactly by synthetic materials, and where the clarified juice is to be used in a form free from $SO_2$ (which bleaches the natural colour to a pale pink) the enhanced depth of colour enables a product, such as jelly, to possess a true black currant colour which is most attractive and characteristic.

## Completion of Action

One of the minor difficulties which are encountered is that of deciding when the enzyme action is complete. The removal of pectin from colloidal solution is not always followed by a "dropping bright" of the liquid. In many cases very little change can be seen, and, where it is necessary to convert the juice into some form of stable product before fermentation becomes excessive, it is of the utmost importance that the juice should be filtered immediately that the enzyme has completed its task. Calcium pectate determinations are of little use for this purpose, not because the information they give is irrelevant, but because of the time-consuming nature of the actual analyses. For this reason Zimmermann and Malsch, and Mass and Mehlitz[4] have made use of the viscometer to indicate the course of pectin decomposition. The viscometer under standard conditions affords a convenient and rapid means of measuring the viscosity of the juice. The two former workers found that with soft fruits the viscosities of the juices after treatment for 12 to 16 hours with 0·3 per cent. Filtragol at 15° to 20° C. approached to the water value for the viscometer.

## Effect of $SO_2$ on Enzyme

A further point of interest which is noted by several Continental workers is that Filtragol is unaffected by $SO_2$ in moderate doses. This enables a juice to be held in an unfermented state, perhaps during very hot weather, whilst the enzyme is allowed sufficient time to effect the desired changes. Krumbholz[5] and Seifert independently found that 50 to 100 parts per million of $SO_2$ were not detrimental to the enzyme.

The Bristol experiments which were referred to above were carried out in the 1936 soft fruit season. It had been observed during the first few weeks of July that syrups made by the Long Ashton cold process from strawberries threw a very voluminous flocculent deposit about a fortnight after making.

The deposit appeared to be pectinous in nature, and in view of the fact that some difficulty had been experienced in manipulating the "cheeses" (on account of the slimy nature of the fruit pulp) it was decided to test Filtragol on a large scale. In the case of strawberry, 12 lb. of Filtragol were mixed into each vat of 600 gallons of milled fruit. After 24 hours (6 to 8 hours in very hot weather) the effect was most noticeable. The slime was dispersed and a remarkably efficient separation of fruit tissue from fruit juice was simultaneously effected. In fact, from a vat containing 600 gallons of fruit, corresponding to 450 to 500 gallons of available juice, it was possible to run off 200 to 250 gallons of practically brilliant juice free from any solid material. The obvious result of this withdrawal of juice was to increase the solidity of the fruit tissue left in the vat, and this was then pressed out with ease and without wastage. Although deposits did form later in the history of the products, they were slight and easily removed by filtration through a plate and frame filter and filter acid.

### Raspberry and Loganberry

Raspberry and loganberry pulp presented little difficulty in the normal course of processing, but the enzyme gave a better yield of juice. In the case of the black currant very high quality fruit in first-class condition was processed. The cold process treatment of over 20 tons of such luscious fruit was anticipated with some trepidation, but no difficulty was actually encountered. The milled fruit was semi-solid and quite impossible to stir when in bulk. Consequently the enzyme base was mixed in as the milled fruit entered the vats by way of the gravity feed from the mill. As a simultaneous part of the process it was necessary for the juice to ferment down to 10 points in gravity and this took on an average 5 days. During this period there was a progressive thinning of the pulp, the fruit tissues collected together and rose to the top, whilst a layer of clear juice equal to 50 to 70 per cent. of the total juice available collected beneath. The solid portion could be dug out and was pressed with ease. There is no doubt that the slight fermentation was instrumental to some degree in effecting these changes, but the major factor was the enzyme. The effect on colour mentioned above was most noticeable in these experiments.

**Natural clarification of strawberry juice in 12 hours, by removal of a clot of pectinous material.**

REFERENCES


[1] Charley, V. L. S. C., *Long Ashton Ann. Report*, 1934, p. 246.
[2] Willaman and Kertesz, N.Y. Agric. Expt. Sta., Geneva, New York, *Technical Bulletin No.* 178.
[3] Zimmermann and Malsch, "Die Obst und Gemüse," *Verwertungsindustrie*, No. 38, 17-9-36.
[4] Mass and Mehlitz, "Die Konservenindustrie," *Allgem. Deutsche Konservenzeitung*, 7, 8, 9/35.
[5] Krumbholz, "Die Konservenindustrie," *Allgem. Deutsche Konservenzeitung*, 39, 40/33.


## DANGER, GAS!

(*Continued from page* 79.)

moisture, exposure to a current of warm air, on vibrating trays, should prove of service in those cases where the substance is particulate enough to be so handled.

This process has already been successfully applied to the removal of excess sulphur dioxide in dried fruits, etc., previously condemned by Port Sanitary Authorities.

Where water is impracticable, machinery and electrical fittings may be swabbed with paraffin or petrol, whilst walls and tiled surfaces may be treated with a thin aqueous paste of bleaching powder.

As air attacks can now be delivered with great suddenness it would be found impossible to improvise the precautions necessary at a few minutes' notice. The Government has prepared a scheme for observing the movements of hostile aircraft and for issuing warnings of impending raiders, and have also issued a number of Air Raid Precautions Handbooks, to which all manufacturers should refer.

Whilst it is not suggested that it would be desirable to issue contaminated food after chemical treatment to consumers, it is possible that a shortage of food might result at some period and in this event the avoidance of waste would be imperative.

PUBLICATIONS AVAILABLE

No. 1. *Personal Protection against Gas.* (6d.)
No. 2. *First Aid for Gas Casualties.* (4d.)
No. 3. *Medical Treatment of Gas Casualties.* (In preparation.)
No. 4. *Decontamination of Materials.* (6d.)
No. 5. *Structural Precautions against Bombs and Gas.* (In preparation.)
No. 6. *Air Raid Precautions in Factories and Business Premises.* (6d.)
No. 7. *Anti-Gas Precautions for Merchant Shipping.* (3d.)

The above are obtainable through H.M. Stationery Office.

In addition those interested might consult:


*Official History of the War Medical Service*, vol. ii. H.M.S.O., 1923.
*Manual of Treatment of Gas Casualties*, W.O. Manual. H.M.S.O., 1930.
*Dictionary of Applied Chemistry*, Thorpe. Supplement, vol. i (280-287).
"The Pathology of War Poison Gases," L. Hill, *J.R. Army Med. Cps.*, Oct., 1920.

# A MILK SYMPOSIUM

## Work on Minor Constituents

THE JOINT meeting of the Society of Public Analysts with the Food Group of the Society of Chemical Industry was held on Wednesday, February 3, 1937, at the Chemical Society's Rooms, Burlington House. It was held in two sessions, at the first of which the Chair was taken by Dr. G. Roche Lynch, President of the Society of Public Analysts, and at the second by Dr. L. H. Lampitt, in the absence of Dr. Franklin Kidd, Chairman of the Food Group of the Society of Chemical Industry.

A very enjoyable informal dinner was held between the sessions at Stewart's Restaurant in Piccadilly, and the attendance before and after it was sufficient to fill the Chemical Society's Lecture Room. All the papers aroused interesting discussion, and owing to shortage of time one paper ("Present Knowledge of the Amylase in Milk", Lampitt, Bushill, and Babb) was not read. Following are abstracts of the papers, all of which proved to be of a somewhat academic nature though full of interest and value.

### Some Minor Component Acids of Milk-Fat and their Possible Significance. By T. P. Hilditch, D.Sc., F.I.C.

The author said that out of 100 molecules of fatty acid combined as mixed triglycerides in normal cow milk-fat there were about 27 to 35 mol. of oleic and 24 to 27 mol. of palmitic acid, whilst butyric, myristic, and stearic acids came, together, next with 7 to 10 mol. each; the rest of the acids might be looked upon as minor, though usually definitely characteristic, component acids. Of the minor saturated component acids, the presence of lauric was to some extent doubtful. Caproic was usually more prominent than caprylic or capric acids in cow milk-fat.

There was present in normal butter-fats a very small quantity (usually well below 1 per cent.) of polyethenoid acids containing 20 (and possibly 22) carbon atoms. Consideration of the proportions of fully saturated glycerides in cow milk-fats, which were abnormally high (for a given content of saturated acids in the total fatty acids) when compared with all other natural fats, led the author and his co-workers to suggest that in milk-fats the lower fatty glycerides were produced from preformed oleo-glycerides by a combined process of oxidation and reduction.

When cod liver oil was included in the diet of cows some of its characteristic polyethenoid $C_{20}$ and $C_{22}$ acids passed into the milk-fat, which then contained 5 to 7 per cent. of these acids. At the same time the yield of milk-fats fell and its composition was considerably altered: the amount of the characteristic lower fatty glycerides produced was reduced to about one-third of the normal, and that of myristic, palmitic, and stearic glycerides was also reduced, but the production of oleo-glycerides was only slightly affected. The effect was temporary, and, after the animal ceased to receive cod liver oil, production of milk-fat of normal composition and quality was resumed in a few days.

### Oxidation-Reduction Systems in Milk. By R. S. Twigg, B.Sc.

Investigations had been carried out to ascertain the capacity of raw and heated milks (whole and skimmed) to reduce a standard concentration of methylene blue, apart from the reducing activities of any bacteria. The work was of importance in view of the recent introduction of the methylene blue test for the bacteriological grading of milk under the Milk (Special Designations) Order, 1936. A special milk was used, of very low bacteriological count, and no multiplication of the bacteria occurred during the progress of the investigations, which were carried out in the absence of oxygen.

From the results obtained it was considered justifiable to consider that raw milk possesses a natural reducing system of its own. Separation of the cream removed sufficient reducing substrates and any necessary enzymes to prevent skim milk from reducing the methylene blue. Heating to 63° C. for half an hour—*i.e.*, pasteurisation—wholly or partially inhibited enzymes necessary for the full activity of the reducing system of whole milk. Pasteurised skim milk behaved like pasteurised whole milk, but with even less reducing activity. Cream itself, if left unheated and suspended in water, reduced methylene blue. Pasteurisation, or heating to a higher temperature, destroyed its reducing activity.

Many substrates were tested for their ability to reduce methylene blue in the presence of washed cream or membrane suspensions. Of all these, only aldehydes and hypoxanthine showed definite reducing activity. Attempts were made to dialyse either whole milk or unwashed cream with a view to building up the reducing system. No success had been attained, and it appeared that dialysis rather quickly inactivates certain of the enzymes. Recent experiments showed that the ascorbic acid content of milk played little or no part in the reduction of methylene blue under anaerobic conditions.

### Some Recent Work on the Lipase and Phosphatase of Cow's Milk. By H. D. Kay, O.B.E., Ph.D., D.Sc., E. C. V. Mattick, M.Sc., Ph.D., and S. J. Folley, M.Sc., Ph.D.

After outlining the methods of estimating phosphatase the authors described the difficulties of devising a satisfactory method of estimating lipase in milk. The best results were ultimately obtained by the use of tributyrin in association with a special buffer, at *p*H 8·5, and with bacteriological control before and after the estimation, the hydrolysed butyric acid being distilled off and titrated. The conditions as to shaking, etc., must be rigidly standardised.

It was shown that all raw milks contain lipase in amounts varying from cow to cow and during the lactation period. Milk lipase is more readily destroyed by heat than phosphatase. There is more lipase in milk serum than in milk-fat, but the reverse applies to phosphatase. It is probable that the lipase and phosphatase in milk are unrelated, and that the phosphatase content affords an index of the efficiency of the mammary gland.

THE ESTIMATION OF CATALASE. By E. B. Anderson, M.Sc., F.I.C., and R. J. McWalter, Ph. D.

In continuation of work on the enzymes of milk it became necessary to study the methods proposed for the estimation of catalase. These divided themselves into two main groups, gas volumetric measurement of the oxygen evolved from hydrogen peroxide, and volumetric estimation of the peroxide undecomposed, either directly with potassium permanganate or indirectly by iodine liberation from potassium iodide. These tests are critically surveyed and a modified iodimetric test is described which avoids the difficulties experienced by other workers. It is pointed out that the estimation cannot be other than on an empirical basis, as the substrate gradually destroys the enzyme, and therefore conditions have been chosen which allow the reaction to approach completion in a reasonable time with maximum destruction of substrate. The results agree quite well with those obtained by a refined gasometric method.

PRESENT KNOWLEDGE OF THE MINOR NITROGENOUS CONSTITUENTS OF MILK. By J. H. Bushill, D.Sc., A.I.C., L. H. Lampitt, D.Sc., F.I.C., and D. F. Filmer, B.Sc.

Casein, albumin, and globulin constitute about 93 per cent. of the nitrogenous constituents of milk, and the remainder (including amino acids and amides, phosphatids, purine substances, ammonia, choline, thiocyanate, and lactoflavine) are to be regarded as the minor constituents. The trichloroacetic acid precipitation method has given the most satisfactory results for the precipitation of the proteins. For ammonia, steam-distillation under reduced pressure has given good results; for urea a modification of the urease method has been devised; and for creatinine a modification of the colorimetric method with picric acid has been used to eliminate the influence of lactose.

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# NINTH SESSION of the INTERNATIONAL COMMISSION for UNIFORM METHODS of SUGAR ANALYSIS

THE ninth session of the International Commission for Uniform Methods of Sugar Analysis was held at the Institute for Chemistry, London, August 31 to September 5, under the presidency of Frederick Bates of the National Bureau of Standards, Washington, U.S.A. Over 100 delegates, representing nearly all of the sugar-producing countries of the world, were in attendance, including representatives from Australia, Mauritius, and Hawaii. The programme comprised the following 16 subjects:

1. Constitution and bylaws.
2. Weighing, sampling, and classification of sugars.
3. Conductometric determination of the ash content of raw sugars.
4. Determination of reducing sugars.
5. Determination of the decolorising power and filtering quality of chars.
6. Testing of molasses.
7. Application of refractometric methods to sugar analysis.
8. The 100° point of the saccharimeter.
9. Standardisation of quartz control plates.
10. Tests for the evaluation of the refining qualities of raw sugars.
11. Elimination of errors due to lead clarification.
12. Determination of raffinose.
13. Colorimetry in the sugar industry.
14. Values of Clergent divisors.
15. Determination of moisture.
16. Determination of the hydrogen-ion concentration.

In addition to the president of the commission, two other members of the National Bureau of Standards polarimetry section attended the session: J. F. Brewster and C. F. Snyder. The sessions were conducted in English, French, and German, although 16 different languages were represented among the delegates. The Bureau's representatives acted in the capacities of either referee or associate referee on a number of the subjects in the preceding paragraph.

One of the most important features of the session was the Bureau's paper on the French Sugar Scale. This scale is used to a considerable extent in France, Belgium, and certain colonial possessions. There have long been two groups among French physicists who were deadlocked on what physical values should be used in the standardisation of the French Sugar Scale. In the present paper, the Bureau was able to demonstrate that the view of neither of these groups was the correct one. It now appears as though the National Bureau of Standards values for the French Sugar Scale will be adopted officially in France, thereby bringing the French scale into agreement with the International Sugar Scale. The latter is the National Bureau of Standards Scale, which was adopted by the International Commission for Uniform Methods of Sugar Analysis at Amsterdam in 1932. The tenth session of the Commission will be held in Berlin in 1940.

# A BIBLE of NUTRITION

There are probably not many men alive to-day who are conscious of having written a " classic ", at any rate in the scientific field. Dr. Robert Hutchison must be one of these few, unless his personal modesty is so great as to have clouded his judgment! It is difficult to imagine what students and practitioners alike, whether in medicine, food chemistry, domestic science, or a number of other subjects, would do without " Hutchison's Food ", as it is familiarly called.

Edition after edition has appeared with almost monotonous regularity. The book was first published in 1900. The present volume is described as the eighth edition, but this does not give a true picture of the immense value that has been recognised in previous editions, for there have been sixteen reprints, apart from the eight editions. There have been, therefore, actually twenty-four issues of this book between 1900 and 1936, just under one a year.

It was in 1935, for the seventh edition, that Dr. Hutchison secured the collaboration of Professor V. H. Mottram, in a praiseworthy effort to make sure that the new edition would incorporate whatever was latest of the accepted views in nutritional science. So successful was the collaboration that it has been continued in this, the eighth, edition. It is gratifying to note that many of the minor errors occurring in the seventh edition have been corrected in the eighth, but one may be permitted to call attention to a number that still require amendment.

It must be said at once, however, before indulging in criticisms that risk the designation of carping, that a book like this must be criticised for every inaccuracy of detail. The book has achieved an almost biblical authority, and rightly so. In the breadth of the original author's outlook, in the extraordinarily wide field of food chemistry covered by description and analyses, in the innumerable side-lights thrown on obscure minor points of daily habit, and in countless other ways, the book is probably without parallel as to scope; it is quite certainly without equal in authority. That being so, it becomes of the utmost importance to secure complete accuracy in every detail, and the only criticism that can possibly be levelled against this book, with its astonishing freedom from any kind of faddism, is for the inaccuracy —not to say inadequacy—of some of the information contained therein. Journals like *The Analyst*, *Chemistry and Industry*, and many others, overseas and at home, have published during the last few years an accumulation of material concerning the analyses of various foods and foodstuffs. It would, indeed, be a work of considerable magnitude to select from these journals the most recent analytical figures with which to replace some of the extraordinarily " dated " tables at present included in the book. Nevertheless, this task should be undertaken. May it be most respectfully suggested to the distinguished authors of this book that they should take in one more collaborator and that he should be an analytical chemist with wide experience of the composition of foods? If this were to be done and his advice were to be taken on all questions of analytical data, the only improvements possible in the book might be brought about. In what is written below examples will be found of the type of correction that might result.

### Proprietary Foods

The authors seem especially indifferent to accuracy in their descriptions of proprietary foods and commercial products generally; it would be much appreciated if the accounts of some of these products could be revised. Three, of which the reviewer has direct personal knowledge, are misdescribed. One of them is credited with containing " vitamins A and C concentrate ", though it actually contains vitamin A concentrate and calciferol; another is stated to be a preparation of the unsaponifiable matter from cod liver oil, though in fact it is made with pure calciferol, and has been for nearly five years; thirdly, of two products to which standardised amounts of vitamin D and iron are regularly added, only one is credited with those additions. There may be similar inaccuracies that the reviewer has not been able to detect; every possible effort should be made to avoid them.

On page 221 is an example of the repetition of obsolete, and incorrect, analyses. It is stated that Professor Church found 13·1 per cent. of fat in wheat germ. This figure is far too high, and certainly includes non-lipid matter that is soluble in the extracting solvent, possibly acetone. In the footnote to this particular table of the composition of the different parts of the wheat germ, we are told that " the germ contains 6·44 per cent. of nitrogen, of which 0·80 grm. is in the form of amides ". It is impossible to extract any meaning from this statement. The table of acid, neutral and alkaline foods (p. 355) loses a good deal of its value from the fact that, we are told, the foods in each group " are arranged in the order of their alkalinity or acidity respectively "; unfortunately no indication is given of whether the order is increasing or decreasing! The statement on page 362, that commercial cocoa powder contains 32 per cent. fat, is incorrect, as is shown by the figures appearing in the tables on pages 364 and 365. From 10 per cent. to 35 per cent. covers the normal range, according to Nicholds.

### Milk Adulteration

In this edition (p. 142) we still find it said that " the Society of Public Analysts . . . regards a specimen of milk with less than 3 per cent. of fat and 8·5 per cent. of solids not fat as adulterated ". The Society of Public Analysts and Other Analytical Chemists—to give it, for once, its proper name—does nothing of the sort, and it is not in a position to do so. It is for the Courts, and for them only, to decide on evidence whether or not a sample of milk, falling below either of the " presumptive " legal limits mentioned above, is or is not adulterated. All that the Public Analyst can do is to certify the composition of his sample and point to any presumption of adulteration. In actually deciding whether or not water has been added, the freezing-point test will in most instances be used, and it is deserving of mention in this connection. Since the Sale of Milk Regulations of 1901, there has been no question of Public Analysts or anyone else laying down standards of milk; the question of adulteration is one of fact, to be decided on evidence.

### Cereals

There is a distinct incompleteness in the remark on page 28 about the rachitogenic properties of cereals, and in the remarks made later on the same subject: moreover, the three passages are not altogether consistent. On page 28 we read that " there is something in cereals which antagonises the action of vitamin D ", and this view is attributed to Mellanby; on page 249 (footnote) it is stated that wholemeal bread " contains a substance, probably phytin, which antagonises bone and teeth formation ". On page 332 we are told that a proportion of the phosphorus in vegetable foods " is present as phytin . . . and that not only is this unavailable to the body, but it prevents the absorption of calcium ". Of the three statements this is closest to the truth, and the other two should be modified to be more congruous with it. It is surely not legitimate to say that phytin phosphorus, which is not absorbed and therefore limits the absorbability of calcium (unless there is plenty of other phosphorus present in the diet), in any sense " antagonises " the action of vitamin D. Its actual effect is that of a deficiency of phosphorus, and therefore of a diminished availability of calcium. Again, it would have been more accurate to say that vitamin $B_2$ (p. 24) is a complex consisting of flavin and several other constituents rather than, as written, " of flavin and another constituent ".

The comment on page 43 that the Eskimo has to rely upon the production of carbohydrate from protein, since he only obtains a very small amount from the meat that constitutes his main food, is carried over from previous editions. It would be worth while for the authors to look into the observa-

tion made to me, by a man of some experience in Arctic exploration, that the Eskimo eats a considerable quantity of seaweed and other material likely to be good sources of carbohydrate—and incidentally of water-soluble-vitamins. In discussing the utilisation of iron (p. 329) some reference to the work of Starkenstein and the different utilisation of different forms of iron, and to the more recent work of McCance, might have been appropriately included.

It must not be imagined that there has been no modernisation even of the last edition. The second report of McCance *et al.* on cooking of foods (in the press when the book was published) and Cox's work on meat extracts both receive mention, and appropriately so.

### Miscellaneous Dietary Matters

A few criticisms may, perhaps, be offered on miscellaneous dietary matters. The authors are characteristically immune to the various semi-mystical statements made about the superior qualities of certain forms of sucrose (p. 308), but they might have referred to the unpleasantly zoological nature of some specimens of health sugars. On page 361 there is a reference to a half and half mixture of Mocha and Plantation coffees, although there has been no previous reference to the second variety. There are some connoisseurs who would quarrel with the observation (p. 394) that "the older the brandy the better": they would maintain that brandy, however distinguished, has an optimal age of between thirty and forty years, and that it thereafter begins to lose in excellence what it gains in antiquarian interest.

What is to be understood by the statement (pp. 453-4) that the hydrochloric acid in the gastric secretion is "fixed by any bases which may be present in the food (*e.g.*, carbonates and lactates)"? The phrase in brackets should surely have been "as carbonates and lactates". It is not clear whether (on p. 326) 5 grains of "lime" daily refers to calcium or calcium oxide. On page 414 the curious phrase, applied to œnanthic acid in wine, that it occurs "in the combined or estereal form" obviously requires correction—"ethereal" is old-fashioned, "esterified" is correct, but "estereal" is neither. There are minor printer's errors on pages 31, 251, and 397. A strange archaism occurs at the top of page 342, where carbonic acid gas is stated to be made by the action of vitriol on chalk! In the year of grace 1936 it would have been more appropriate to say that carbon dioxide was made by the action of sulphuric acid on calcium carbonate.

However, this enumeration of minor inaccuracies, apart from being possibly of assistance to the authors in making still more error-proof the next edition, serves incidentally to illustrate the extraordinary range of subject covered in this fascinating book. Unlike most textbooks, it can be read, and read from cover to cover. If there is any man in this country, or in any other, who could do so without learning something, the reviewer, for one, would like to meet him. But he certainly does not exist.

A. L. B.

*Food and the Principles of Dietetics. By Robert Hutchison, M.D., LL.D., F.R.C.P., and V. H. Mottram, M.A. Eighth Edition.* 1936. *Pp. xxvii+634. 21s.*

# MORE BOOKS for the FOOD MANUFACTURER

## Sugar Machinery and Equipment

The manufacture of sugar, beyond all other branches of food manufacture, is distinguished by the colossal size of its operations and the degree of its technical development. The astonishingly low price at which sugar can be produced is in part, at least, accounted for by the very high degree of mechanical and physical efficiency which has been developed in the industry. The dimensions of each part of the plant in relation to the rest and to the total output have been worked out to hair's breadths to diminish wastage of power and material to the utmost. Sugar manufacture has become an exact science. This book proves it; and it thereby affords an occasion to manufacturers of other foods to humble themselves in amazement before these high technical achievements, and to hasten to take full advantage of the experience of a great industry and of a great exponent of it.

For that is what Mr. Tromp undoubtedly is. He makes his subject seem so straightforward and inevitable. You feel safe with him; he has it all at his fingers' ends. To imitate the title of a recent "best-seller", his book should have been described as "Sugar Machinery for the Million". He has clarity and fluency, but no useless verbiage. Explanations of principles, descriptions of different mechanical solutions of a problem, the calculation of dimensions and capacities—these and many other things all flow along easily under his pen. Quantitative data appear in the text just at the moment they are called for, and their value is at once evident, which might not be the case had they been relegated to tables at the end of the book. This quantitative detail is copious, and very largely based on the author's considerable practical experience of machinery design and operation.

A great help in following the discussion of the various subjects are the drawings of plant and equipment on nearly every page, prepared by the author himself. These are all very clearly drawn, with essential dimensions indicated. In addition there are numerous plate illustrations of typical machinery.

The food manufacturer and his engineering staff can pick up valuable ideas and information almost anywhere in the book. The title hardly does justice to the full range of treatment given. Among the subjects of wide general interest dealt with are such matters as water supplies, factory transportation, steam and power production, pumps, piping, filtration equipment, lubrication, steam traps, storage of sugar and fuel oil, an analysis of the relation between live and exhaust steam, etc. The section on heat balances in factory control is worthy of study; this subject might well receive more attention than at present in many food factories.

In face of the range of information presented, it is only with temerity that the reviewer dare mention where a little more detail would have interested him. One such place is the section describing the use of finer filtering media and filter-aids; another is the description of apparatus for boiling control. The remarks on "degree of supersaturation" (p. 429) might also have been amplified (though this is perhaps hardly an engineering topic), and the account of the working of the polariscope is too brief to be altogether sound.

As far as it has been possible to check the calculations and data, they appear to be thoroughly reliable. Only in equation 104, in the discussion of evaporation, has a trivial slip been noted (omission of "÷ 100"). The index on the whole is adequate; there are some obvious omissions, but this is discounted by the systematic way in which the subject has been divided into its thirty-seven labelled chapters.

A buyers' guide of agreeably cosmopolitan character is included at the end.

The quality of the type and the layout of the text greatly assist in giving the book its very readable character, and, together with the excellence of the reproduction of the plates, ensure that the publishers and the printers shall have their share of the laurels.

C. L. H.

*Machinery and Equipment of the Cane Sugar Factory. By L. A. Tromp. Pp. xii+644+56. With 616 drawings in text and 133 plates. Price 30s. net.*

## Two Books on Flour Milling

The literature on Flour Milling which, as yet, can scarcely be termed overcrowded has been enriched by two books recently published.

*Flour Milling Processes*, by J. H. Scott, is a book written by a practical miller for millers. In his preface the author states that when he began milling some years ago he was surprised to find out how indefinite was the information available in regard to many of the most important and fundamental operations of flour milling. Flour milling is a very complicated affair, and there are many views held by different millers that are apparently contradictory. Opinions vary about purifications, and there are still some millers who prefer centrifugals to plansifters.

Mr. Scott has carried out a number of experiments to obtain a further insight into the inner workings of the mill, and the results of these experiments and observations are presented in the book for the benefit of those who are assailed by the same doubts, but lack the facilities for carrying out investigations of their own. Mr. Scott has been an engineer and miller on the staff of the well-known firm of Henry Simon, Ltd., for twelve years, and as such he has had many opportunities of intimate contact with many mills, large and small, at home and abroad. In a foreword to the book, however, Sir Ernest Simon makes it perfectly clear that the views expressed are those of Mr. Scott and not in any way the official opinions of the firm of Henry Simon. This firm has done good service to the milling industry by permitting this book to be published. The book falls into two main sections: (*a*) Wheat Treatment, (*b*) Milling.

In the first, particular attention is devoted to wheat cleaning, and the chapter on the machines used in wheat cleaning is particularly complete and extremely well illustrated. It includes a description of the Millerator, which is the latest innovation to wheat cleaning. There is also an excellent account of spiral separators which are very useful for the removal of spherical seeds. Some wheats, particularly those from the Danubian basin, contain numerous peas, and these are removed very efficiently on these helter-skelter machines. Some attention is given to effluent recovery plants, but it is doubtful whether these are really worth bothering about. The section on the behaviour of moisture in wheat is very well treated, particularly that on the mathematics of the internal moisture movement. This leads naturally to the problems of conditioning. As one might expect, some prominence is given to the radiator type of conditioner. The chapter on bushel weight is very complete.

The second section of the book is devoted to the processes of milling after the wheat has been cleaned and conditioned, and this section is about twice the length of the first section. It follows on stereotyped lines from the break rolls via scalping, grading, and purification to the reduction system. One of the most interesting chapters is that on sundry experiments on reduction roll grinding, and such debatable subjects as the efficacy of finely grooved rolls in the prevention of flaking are discussed dispassionately. The notes on detachers are very useful. One might doubt the advisability of including the chapter on the characteristics of the various machine and commercial flours, as this covers practically the whole realms of cereal chemistry and obviously is too big to be treated adequately in thirty pages. The result is a very general résumé of work done in this field, rather emphasising the writer's familiarity with current research work than giving much real information to the reader. The notes on types of flour used in the United Kingdom, including bread-making flours, pastry flours, and biscuit flours, occupy only a page and a half, and are so incomplete that they might well have been omitted.

The book is extremely well produced, and, apart from the inadequacies just referred to, contains a mine of valuable information for the experienced miller as well as the student of flour milling. It is worth a guinea of anybody's money.

The second book is called *Flour Milling Technology*. Its contents are familiar to most millers, as it is merely a reprint of correspondence course lessons given in *Milling* under the auspices of the National Joint Industrial Council for the Flour Milling Industry by Mr. Leslie Smith in 1935-36. This is essentially the student's book, and will prove invaluable to those preparing for the flour-milling examinations. Owing to the generosity of the publisher, who has issued it at cost price and is taking no profit out of it at all, it is placed at the student's disposal for the modest sum of 3s. 6d. It is impossible and unnecessary to enter into any details of its contents here. Every student of flour milling should get a copy at once. An outstanding feature is the abundance of clear and useful diagrams.

T. H. F.

## A 6d. Book for All

One of the most fascinating little medical books that has ever been written for laymen is called *How to Escape Colds and Influenza*, and is now obtainable on the bookstalls at 6d. It begins by pointing out the enormous frequency of colds, the average person having from two to three colds per annum, and reveals startling facts about the economic loss to individuals, and about complications which often follow severe colds. Influenza is similarly dealt with. By means of illustrations and interesting descriptions the layman is told how cold and influenza microbes breed and how they gain access to the nose and throat.

The facts given are interesting and authoritative. It is pointed out that colds are not usually regarded seriously, but that they should be carefully watched by the prudent person. The book tells how to avoid and treat them. The popular fallacy that a chilling produces a cold is dispelled, and the effect of the chilling is clearly described.

One of the most fascinating chapters deals with the microbes which cause the diseases. Their pernicious habits are described and interesting illustrations given.

The danger of sneezing is emphasised, and it is pointed out that sneezes, which transmit many diseases, kill more people than war! The effects of clothing, feeding, and various treatments are fully discussed; there is a description of how to use a clinical thermometer, how to detect approaching complications, and similar valuable advice.

In 1918-19, 151,466 civilians in England and Wales died from influenza, and in India six million in the same year. This almost unbelievable fact has behind it the authority of the Ministry of Health.

Though extremely interesting and frank, the book is obviously written by practical-minded physicians. It tells the layman all that he can reasonably do to protect himself and others. If this book were read by every man and woman in the country there is no doubt whatever that they would save themselves an enormous amount of discomfort and ill-health, and the result in national health improvement generally would be a sure proof that insufficient care is taken at present, and that the damages caused by the common cold are underestimated.

C. G. R.

*How to Escape Colds and Influenza. By a well-known Bacteriologist and a London Physician (M.D., F.R.C.S.). Pp. 80. 9 Appendices. 6d.*

## THE B.I.F. and the FOOD MANUFACTURER

(*Continued from page 85.*)

### Low Temperature Insulation

A new type of sectional insulating material was shown this year by *Newalls Insulation Co.* This is called "Low Temp." insulation because it is produced for temperatures up to 250° F. It is therefore of special interest to the food manufacturer who is not much concerned with temperatures greatly exceeding the boiling point of water. Important also is the fact that the sections are only half the price of sections of the "Magnesite" type of insulation. Sections are made for piping up to 4½ in. outside diameter.

**Short news items from the Birmingham Section of the British Industries Fair will be found on page 96.**

# Fluorescence Analysis of FOOD SUBSTANCES

by J. A. Radley, M.Sc., A.I.C.

*[The fact that many substances show fluorescence in ultra-violet light can be used as a means of sorting and checking materials in food laboratories. The author mentions some of the substances which can be detected by this means.*—ED.]

THAT MANY substances show fluorescence in ultra-violet light has been well known for many years, but probably one of the first to suggest making use of this property for their identification was R. W. Wood in 1911. He pointed out that such tests could be employed in a number of industries, among them the food industry, but it was not until a cheap and efficient source of ultra-violet light became available for laboratory use that chemists gave serious consideration to this new weapon for analysis. With the introduction of such an apparatus many workers turned their attention to the new method, and a spate of papers appeared, the evidence in which was so contradictory, or vague, that the method was brought into discredit. In the last few years many chemists have worked to put the method on a rational basis, and it may be safely stated that it supplies a valuable means of rapidly sorting and checking materials used in different branches of technology and science.

Samples are usually examined in the massive state, or in solution, and in many cases no fluorescence, or a weak fluorescence only, is observed. A number of these substances, however, may be treated with various reagents in order to produce end-products which are very highly fluorescent, and may, therefore, be detected readily under the lamp in high dilutions. Many of these reactions are specific, while others, which are not, afford good presumptive evidence, or confirmation, of the presence of the original compounds.

It is not possible in a short space to go into these tests fully, but the following notes indicate the scope and delicacy of the method as applied to foodstuff analysis.

## Preservatives

Certain compounds, such as "Abrastol," are decomposed into their constituents by means of acid, the solution made alkaline, and examined under the lamp. "Abrastol" treated in this way shows the strong fluorescence due to $\beta$-naphthol detectable in 1 part in 50,000.

Sulphur dioxide in quantities as small as 0·25 mgm. can be detected[1] by distilling the acidified solution (10 c.c.) into a tube containing a dilute hydrogen peroxide and a few milligrams of quinine. In the presence of sulphur dioxide the intense fluorescence due to quinine sulphate is observed in the receiver tube.

Sulphides and hydrogen sulphide to the extent of only 0·1 mgm. of sulphide sulphur has been detected by J. Grant by the same method.

Nitrites are readily detectable by the red fluorescence that is obtained when an 0·1 per cent. solution of Magdala red is added; nitrates, incidentally, are inert.

Boron can be detected in quantities as small as 0·02 mgm. by the test due to N. F. Zhirov, in which the suspected material is heated with a small amount of fluorescein and the mass obtained examined under the lamp. A brilliant blue-green fluorescence is obtained.

L. Szebelledy and J. Gaál find that a brilliant orange-yellow fluorescence is given by boric acid solution to which cochineal extract is added. The solution is buffered at *p*H 5·8 to 6·9 by means of buffer solutions of $KH_2PO_4$ and $Na_2HPO_4$ (equimolecular mixtures).

Heavy metals retard or prevent the rate of formation of the specific fluorescence, whilst aluminium and magnesium iron alter its shade. Carbonates should be removed as the carbonate ion interferes with the reaction. The sensitivity of the reaction as a micro-reaction using 0·1 c.c. of reagent and 10 mgm. of sodium acetate as a buffer is 0·50 in 0·025 c.c. Under the conditions described the test is specific for boric acid. It should be quite possible to distil off the boric acid by the well-known method using methyl alcohol and testing the purer product thus obtained.

Another test for boric acid is to heat to 800° C. with 0·1 per cent. sucrose, when a yellow-green fluorescence is given by the resulting mass.

Formaldehyde[2] may be detected by addition of alcohol and adding a solution of naphthoresorcinol in hydrochloric acid, when the presence of 2 parts per million of formaldehyde present is detectable by the blue fluorescence of the resulting compound.

Arsenic, on rare occasions, appears as contamination in foodstuffs in small quantities, so it might be appropriate to point out here that the paper from the ordinary Gutzeit test may show no coloration in daylight, but under the lamp the presence of traces of arsenic too small to give any coloration visible in ordinary light is readily detectable, the presence of 0·000,001 gm. of arsenic being detectable.

## Natural Acids

One part in fifty thousand of lactic acid may be detected by the addition of a crystal of o-oxydiphenyl and sulphuric acid and heating. Isobutylaldehyde is also detectable by the same test, while pyroacemic acid is detected by reduction to lactic acid with nascent hydrogen,

1 part in 16,000 being the limit of sensitivity; but if p-oxydiphenyl is used this figure is increased to six times this value.

Tartaric acid may be detected in quantities of 1 to 10 mgm. by the use of $\beta\beta$-dinaphthol, the limit in this case being 1 part in 50,000. This test is particularly valuable in being specific for tartaric even in the presence of very closely allied acids. Amounts of glycerol over 0·000,005 gm. are detectable by a reaction involving heating the glycerine with bromine, and, after removing the bromine, treating the residue with meta-hydroxy benzoic and sulphuric acids.

Fruit acids have received attention from a number of workers, one of the first being Colombier, who elaborated a test for malic acid. He takes 3 c.c. of the liquid and evaporates it on the water bath after the addition of 1 c.c. of a solution of resorcinol. The residue is treated with sulphuric acid, reheated on the water bath, then diluted and neutralised. A bright blue fluorescence is given in the presence of 1 part in 100,000 of malic acid in the solution.

F. Feigl and co-workers have examined a number of dicarboxy and keto acids by this method, and confirm Colombier's result. They find that concentrations of 5 parts in 100,000 are readily detectable with a number of these acids, the fluorescence being characteristic for some. Celci found that the test gave a positive reaction with citric and aceto-acetic acid, and, to make the test specific for malic acid, orcinol should replace the resorcinol. Full details of the tests may be found elsewhere.[4]

Contamination or adulteration of edible fats or oils with mineral oil occasionally occurs, and the well-known very intense fluorescence of mineral oils serves as a very useful check to the chemical tests where the amounts of mineral oil present are sufficient to be estimated, and is invaluable for detecting traces. The dilution in which the actual fluorescent compound may be detected is very great, being probably in the neighbourhood of 1 in 10 millions.

### Sugars

Many sugars after certain processing can be differentiated one from another, and a valuable check on the ordinary chemical methods is provided. The writer[4] has found that Cayaux's method for the detection of sucrose in milk or cream is greatly sensitised when examined under the lamp, and facilitates forming an opinion when in doubt. Lævulose, arabinose, and rhamnose give a green fluorescence when the Rimbach-Weber reaction is carried out in ultra-violet light, and it is interesting to note that polyhydric alcohol sugars, such as mannite and dulcite, give no positive test under these conditions. Aldoses and methyl pentoses can be detected, whilst for dextrose there are several tests, among these being to heat the solution with hydrochloric acid and orcinol and dissolving the yellow-red product in alcohol, when a green fluorescence is produced. Fructose heated with resorcinol and hydrochloric acid shows a similar green fluorescence after the *p*H has been suitably adjusted with alkali, followed by extraction with amyl alcohol.

It may not be out of place here to indicate that a number of biological substances are detectable in very great dilutions; for example, urobilin shows a visible fluorescence in the concentrations of 1 : 1,000,000. Certain plant substances also are highly fluorescent, one of the best examples probably being æsculin, 1 part of which in 10,000,000,000 parts of water shows a typical blue fluorescence. Quinine sulphate is detectable by its bright blue fluorescence when present in dilutions of $0{\cdot}5 \times 10^6$, and, incidentally, it can be used as an indicator in volumetric work, the fluorescence altering at definite hydrogen ion concentrations. With this substance the intensity of fluorescence of its solutions is proportional to the concentration, and quinine itself may thus be estimated.

From the foregoing it will be seen that in many cases the ultra-violet lamp affords valuable means of gaining additional information about a product in food laboratories. At the present stage of the subject it should be used as an auxiliary means only, the evidence from which must be taken in conjunction with chemical and physical tests, before stating an opinion.

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## DISCOLORATION and CORROSION in CANNED CREAM

RESULTS of the researches so far carried out on discoloration and corrosion in canned cream, by C. J. Jackson and C. R. Howat of the Hannah Dairy Research Institute and T. P. Hoar of the International Tin Research and Development Council, appeared in the *Journal of Dairy Research* recently and have now been issued as Technical Publication Series A. Number 49 of the International Tin Research and Development Council.

Bronzing, purpling, and blackening of tin cans containing cream are shown to be due to tin sulphides produced by the breakdown of proteins when the temperature or the duration of the sterilising process are too great. The liberation of sulphide from canned cream does not appear to be assisted by the presence of alkali, and although sodium bicarbonate is commonly used as a stabiliser in small amounts, this substance is probably beneficial in preventing purpling during storage. The effect of exposed steel on the cream is adverse and points to the need for the tin coatings to be as free as possible from pores.

## COLLAPSIBLE TIN TUBES for PACKING FOODSTUFFS

THE sales of all kinds of products packed into collapsible tubes have greatly increased during the last few years. A new development is the packing into Collapsible Tin Tubes of foodstuffs such as potted meat, anchovy pastes, mayonnaise, mustard; even coffee, honey, butter and others have successfully been packed into this handy container.

Manufacturers in this country have been slow in taking to this new pack, while countries like Germany and particularly Switzerland are making continuous headway in this respect.

This pack would in many instances offer advantages to the general public and also open up new possibilities of a substantial export trade.

Foodstuffs packed in collapsible tubes are very handy in small households, for picnics, canteens, snack bars, to take along on a journey, or even for taking along to work.

It would be a welcome development if British manufacturers were to follow up their Continental competitors, and eventually further improve their method of packing.

The picture shows ready-for-use mustard packed in a collapsible tin tube by a Swiss company. The mustard keeps fresh and moist and is protected from contamination until used.

## SHORT NEWS ITEMS from the B.I.F., BIRMINGHAM

*The Welsh Plate and Sheet Manufacturers* were again represented, and quite half of the display area of the stand was devoted to large photographic and sample illustrations of can-making and canning.

*Arthur Holden and Sons*, of Birmingham, displayed many examples of their work for can and tin box makers, as well as for the painting of the food factory. Mr. A. Ll. Matthison's little book, *Baking Lacquers for Food, Fruit and Preserve Tins*, is now issued in its fifth and revised edition.

*E. W. Bliss Co.* was the only can machinery making firm at this Fair, and amongst the machines on their stand is one of their No. 16B seamers for ham and meat cans.

It was interesting to learn from *Stelcon (Industrial Floors), Ltd.*, that in the past six months or so the amount of business they have done has increased by no less than 75 per cent.

*Robert Bowran and Co., Ltd.*, were displaying plaques demonstrating the various tints of their "Permotint" Washable Wall Paint, which is highly recommended for the painting of walls in food factories.

Though *Cuxson, Gerrard and Co., Ltd.*, supply adhesive tape for the sealing of food packages, the principal features of their exhibit were their Sanoid First Aid Requisites and Equipment, specially designed to conform with Home Office factory regulations.

"News on Air" is the title of the latest booklet issued by *Standard and Pochin Bros., Ltd.*, in which their different types of heating apparatus for factories are illustrated and described.

*B.E.N. Patents, Ltd.*, have increased the number of the applications of their spraying apparatus in food factories. The list of users displayed includes Hovis, Ltd., H. T. Heinz, Ltd., Crosse and Blackwell, Ltd., Alfred Bird and Sons, Ltd., Oxo, Ltd., and Scribbans and Co., Ltd.

"Plytainers" is the trade name of *T. E. Dingwall, Ltd.*, who specialise in Canadian birch plywood and spruce lumber cases. These are of solid wood framework and plywood construction, affording lightness, flexibility and strength.

Automatic coal flow direct from store to furnace is the object of one stoking device shown by *Ashwell and Nesbit, Ltd.* They would be found useful in the comparatively small factory.

*The British Thomson-Houston Co., Ltd.*, have found space on their stand to demonstrate the different intensities of lighting required for various factory operations from setting type to reading finely etched scales. A study of lighting conditions in relation to different manual operations in the factory will repay time and expense devoted to it. Do not forget the provisions of the new Home Office Factory Bill regarding the provision of better lighting. Light for all purposes was one theme of the *G.E.C.* exhibit.

There is considerable activity amongst firms building electrically driven vans and trucks on account of their extensive use in the food industry. The *Morrison Electric Co.* were showing the 107th vehicle built for the Midland Counties Dairies.

# INDUSTRIAL NEWS

### H. C. H. Graves Appointed Chairman of Vitamins, Ltd.

Mr. H. C. H. Graves has been appointed chairman of Vitamins (proprietors of Bemax, etc.) and of its subsidiary, Agricultural Food Products, in succession to the late Viscount Feilding. Mr. Graves, who is a partner in Rose Van Cutsem and Co., has been a director of Vitamins since the earliest days of the company. In 1932, on the death of Dr. M. J. Rowlands, the inventor of Bemax, Mr. Graves, who was then only 29, was appointed managing director. Now, at the age of 34, he becomes chairman.

### E. D. Morton Retires from the Board of C. and E. Morton

Mr. E. D. Morton has retired from the board of C. and E. Morton, provision merchants. He has been a director since its inception in 1912, and has latterly acted as chairman. Mr. O. L. Morton, deputy chairman, has been elected chairman. Two other firms of which Mr. E. D. Morton is a director are Frome Vinegar Brewery Company and Jackson Brothers (of Knottingly).

### Mr. Frank Parkinson's Munificent Gift

Mr. Frank Parkinson, Chairman of Crompton Parkinson, Ltd., has presented £200,000 to Leeds University for the erection of new buildings.

The University Council at a special meeting passed a resolution expressing its deep gratitude to Mr. Parkinson for this magnificent gift. This is not the first time that Mr. Parkinson has shown his interest in Leeds University, as he recently instituted a special scholarship fund with a gift of £50,000 for the cause of education in Yorkshire.

This generous gift will be utilised for a central block which will provide the main architectural feature of the whole of the University building scheme and will add greatly to the educational and social amenities of Yorkshire.

▼ ▼ ▼

The Leipzig Engineering Fair takes place from March 1 to 9, and by applying to the Leipzig International Industries Fair, First Avenue House, 45, High Holborn, W.C. 1, readers can obtain a leaflet entitled "Technical Reports (Machines for the Foodstuffs and Table Luxuries Industries)".

### Death of Mr. L. J. de Whalley

The death occurred on January 9, at his home in Orpington, Kent, at the age of 88, of Mr. Lawrence John de Whalley, B.Sc., F.I.C. Mr. de Whalley was one of the founders of the Chemical Club, a Fellow of the Institute of Chemistry since 1911, and a Fellow of the Chemical Society. After many years of research work in the sugar industry he retired about five years ago.

### The Delco Electric Motor Exhibition

The second annual exhibition of refrigeration and the application thereto of Delco Electric Motors was held from January 26 to 29 at the works of Delco-Remy and Hyatt, Ltd., 111, Grosvenor Road, London, S.W. 1.

Among the commercial refrigeration exhibits were compressors and storage cabinets by Coldair, Ltd., Frigidaire, Ltd., the Gramophone Co., Ltd., Kelvinator, Ltd., Marco Refrigerators, Ltd., and Pressed Steel, Ltd., all driven by Delco motors.

A number of special demonstrations included an insulation test showing a Delco electric motor running submerged in water, a test of overload capacity, a starting torque test, a stop and start test, a demonstration of the Delco Thermotron overload protective device, a silence test, and radio interference suppression.

Delco are the largest manufacturers of small motors in the world, and over one million motors were manufactured in 1936 of which 80 per cent. were for refrigeration.

### South Wales Trading Estate

Work on the 310-acre site of the Government-financed trading estate in the Special Area of South Wales, between Cardiff and Pontypridd, began on Monday, December 21.

Applications for sites have been received from 24 firms in a wide variety of industries, and six factories are to be erected immediately in addition to the paper mill.

The estate, which was inspired by the Commissioner for the Special Areas, is a non-profit-making concern, and its nine directors give their services free. It is to be known as the Treforest Trading Estate.

### Canners' Exhibition for Birmingham

This year's Imperial Fruit Show and Canners' Exhibition will be held in Birmingham, from October 19 to 28. This will be the show's third visit to Birmingham, and the exhibition will be staged at Bingley Hall.

### Food Company Registrations

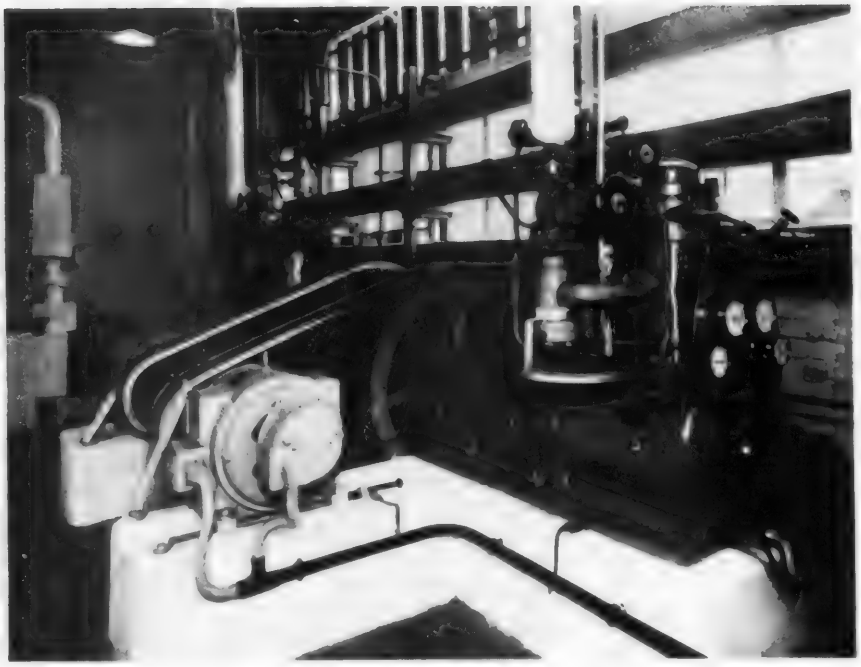
The annual statistical report prepared by Jordan and Sons, Ltd., Company Registration Agents, Chancery Lane, London, gives details of the number of new company registrations during 1936. The total number of companies registered falling in the class "Food" is 1,007, having a capital of £10,846,710 divided into 17 public companies with a capital of £7,431,000 and 990 private companies with a capital of £8,415,710. The "Food" section is the second largest class in the number of companies registered and the fourth largest in the capital involved.

### Mercantile Credit

Another development in connection with the financing of commercial transactions, particularly in those industries in which extended credit is customary, is being undertaken by the Mercantile Discount Company, which has been formed in association with the Mercantile Credit Co. group.

The special function of the Mercantile Discount Co. is to finance trade accounts for manufacturers and wholesalers of good standing, thus making it possible for substantial capital to be freed for increased business. The plan is specially suitable for trades and industries in which credit periods of two months and upwards are customary.

The plan allows a valuable experimental period of capital expansion to be carried out. The immediate translations of sales accounts to available capital enables the manufacturer to increase output by the purchase of more new material, the employment of more labour, and the increase of stocks to take advantage of improving trade conditions, while allowing time to ensure that favourable conditions will persist before taking the risk of increasing his capital structure.



Refrigerating plant installed by the Pulsometer Engineering Co., Ltd., at Messrs. Huntley and Palmer's, Reading.

## Motorised Valves

The British Thermostat Co., Ltd., Sunbury-on-Thames, Middlesex, have issued a new catalogue section dealing with their Teddington hydraulically operated motorised valves. In most cases of thermostatic control, involving the operation of valves or dampers, the impulse of the temperature-sensitive element is very small compared with the effort required to operate the control. In the Teddington valves, the final operating force is hydraulic pressure generated by an electrically driven oil pump. In applications where the single control-cycle—fully open and fully closed—suffices, the pump motor is switched on and off by a thermostatic switch of normal type. For close regulation, however, an "inching" control is provided. The motorised valves are made in a range of sizes from ¾-in. to 5-in. valve seat diameter, and for a wide range of working pressures and operating conditions.

▼ ▼ ▼

Owing to the continued expansion of business the Trepur Paper Tube Co., Ltd., are taking over additional premises adjoining the present factory at Perivale, and the city offices will also be moved to the same building. All departments will be concentrated in future at Bideford Avenue, Perivale, Greenford, Middlesex (Telephone: Perivale 4448; Telegrams: Trepurcan, London).

## Fire Cement Gun

The latest device put on the market by J. H. Sankey and Son, Ltd., of Ilford Essex, is the "Pyruma" fire cement gun, described in a leaflet issued by the Company. The gun is for washing, coating, or spraying large firebrick linings of industrial heat users. It is said that not only is time and labour saved, but a coating, washing, or spraying application through the "Pyruma" gun is more permanent. The full impingement of the cement from the gun penetrates the pores of the firebrick, firmly fills up all cracks, interstices, and corners, the latter in particular, as they are not often reached by brush or trowel. The gun is simple in operation and requires a working air pressure of 40-50 lb. per sq. inch.

## Extension to Bottling Works

The business recently carried on by Wm. Proctor and Co. has been taken over by Tees Bottle Works, Ltd., who have extended the plant and entered into new premises at Bridge Road, Stockton-on-Tees. The management is still in the hands of Mr. Proctor and his son.

The firm is now in a position to undertake the manufacture of the full range of bottles which they have previously made, and are prepared to manufacture any special type of bottle.

## New A.C. Geared-Motor Units

For outputs of the order of 10 h.p. at 415 r.p.m. down to 2½ h.p. at 145 r.p.m. a double-reduction gearbox is seldom necessary. With this in mind the British Thomson-Houston Co., Ltd., has now put forward a single-reduction box specifically to meet the demand for small units with a speed ratio not exceeding 5 : 1. The new units are at present designed for A.C. slip-ring or squirrel-cage machines up to 10 h.p. at 2½ : 1 ratio, or 5 h.p. at 5 : 1 ratio. The same sturdy construction and accurately generated helical gears which distinguish the double-reduction units is extended to the new range of single-reduction machines.

The gear efficiency is, however, slightly higher—being at least 99, irrespective of ratio. Three sizes of gearbox are available.

The pinions are of nickel-chrome steel, and the gear wheels are cut from solid-forged special quality steel blanks. The gears are self-lubricating, the large wheel running in an oil bath, while special precautions are taken to prevent oil leakage along either high-speed or output shafts; the motor bearings are grease packed. The units, after being put to work, need no attention beyond adding a small quantity of oil from time to time, to maintain the level necessary as indicated by the oil gauge.

## Hull City Issues Fine Booklet

From the City of Hull Development Committee comes a first-class 130-page well-illustrated booklet entitled *The City and Port of Hull.*

Claimed to be Britain's cheapest port, and the third largest in the United Kingdom, Hull, besides the usual rail facilities, is linked up with 600 miles of inland water navigation to densely populated areas.

Covering a total water area of about 210 acres, its docks possess over 13 miles of quays and a river frontage of over seven miles.

Of interest to our readers are the following facts. The city has 900,000 cubic feet of cold storage, is the largest centre of the seed crushing and oil extracting industry in the world, is one of the largest centres of the flour-milling industry in the U.K., imports more than six million packages of fruit and vegetables per annum, is famous for deep sea fishing, including allied industries of ice manufacture, drying, curing, box-making, cod liver oil refining, etc.

The Town Clerk, Guildhall, Hull, will be pleased to send a copy of this book, which, incidentally, is published in approved Coronation colours, to any of our readers.

The book is packed with statistics and photographs of various food factories.

The Paterson Aquascope for determining the *p*H value, showing the case open.

## *p*H Measurement

The Aquascope, a production of the Paterson Engineering Co., Ltd., Windsor House, Kingsway, London, W.C. 2, is a special portable instrument for determining *p*H values. It consists of a small neat box containing three colourless graduated glass cells of narrow rectangular shape fitting into slots. There is provided a bottle of one or other of the reagents along with a small pipette with a rubber bulb and a set of metal slides containing a circular section of coloured glass, each graduated in intensity corresponding to the *p*H value. The centre glass receptacle is filled to the mark with water to be tested and a measured amount of reagent (1·5 c.c.) is added by the pipette, when the colour changes immediately according to the acidity or otherwise. Water is filled into the other two glass cells and the colour in the centre glass observed through a circular window in the front of the box. One or other of the metal slides is then inserted behind the other glass cells until the colour is an exact match with that of the centre cell, when the *p*H value is read off direct from the corresponding slide.

For the most part the indicator used has a range of *p*H 6·0 to 7·6—*i.e.*, it indicates very slightly acid and alkali to an extent of 1·0 division acid below 7·0 (the neutral point), and 0·6 above, the colour change being from yellow to blue.

▼ ▼ ▼

Griffin and Tatlock, Ltd., Kemble Street, London, W.C. 2, have published a sale list of chemical apparatus. The apparatus detailed in the list is all in new condition, and it is seen that substantial reductions in price have been made.

## Coronation Printing Inks

Johnstone and Cumbers, Ltd., manufacturers of printing inks, have produced two special coronation colours called coronation blue and coronation red. They are suitable for tin and cardboard containers and for display. They are fast to light and have a strong covering power. The company state that the cost per thousand when these colours are used shows a saving as compared with the average ink of 12 to 15 per cent. They claim that they are two of the most economical inks on the market.

## First Aid in Factories

We have received a draft of Orders and Regulations which the Secretary of State proposes to make under section 29 of the Workmen's Compensation Act, 1923, section 7 of the Police, Factories, etc. (Miscellaneous Provisions) Act, 1916, and section 79 of the Factory and Workshop Act, 1901, amending the requirements contained in the existing orders and regulations as regards the marking of first-aid boxes and cupboards at factories, workshops, docks, and premises where machinery is used for the purpose of building operations.

Any objection with respect to the drafts must be sent to the Secretary of State by March 5. Every objection must be in writing and must state the portions of the draft regulations objected to, the specific grounds of objection, and the omissions, additions, or modifications asked for.

## Manucol

Manucol Products, Ltd., Thames House, Millbank, S.W. 1, have issued a booklet describing Manucol, which is a highly polymerised and purified form of sodium alginate. The constitution of alginic acid is suggested and information given on its preparation and properties. Alginic acid dissolves in solutions of the carbonates or hydrates of the metals to give the corresponding alginates. Manucol (sodium alginate) is a finely divided white powder dissolving in water to give very viscous colourless solutions—there are five grades of Manucol available giving solutions of different viscosity.

It is claimed that Manucol has many unique applications in the manufacture of foodstuffs as a gelling colloid. It can be used as a stabiliser in ice-cream in place of gelatin or Irish moss; to prepare quick-setting, firm table jellies, which can be served cold or hot without fear of melting or breaking down; to thicken milk or cream in the preparation of milk jellies, creams, chocolate desserts, etc.; as a base for custard powders; as a thickener and suspending agent in sauces, mayonnaise, and dressings.

Manucol is supplied in grades numbered I. to V. depending upon the viscosity in centipoises of a 1 per cent. solution at 15° C.

A Multitubular Heat Exchanger recently supplied to Messrs. Cadbury Bros. by The Liverpool Refrigeration Co., Ltd.

# TRADE LITERATURE RECEIVED

### Copper in Chemical Plant

An extremely well-produced book is *Copper in Chemical Plant*, just published by the Copper Development Association, of Thames House, Millbank, S.W. 1. It should interest all readers who are engaged in the design or use of plant in the chemical and allied industries, as its object is to indicate some of the applications of copper in the chemical industry and to review briefly the physical, mechanical, and corrosion-resisting properties upon which the use of copper depends. Some of the typical operations involved in the manufacture of copper plant are also described, and there are thirty-eight excellent illustrations.

### Brewery Equipment

We have received from John C. Carson, 149, Farringdon Road, London, E.C. 1, copies of their two new pamphlets entitled "Seitz" Beer Sheet Filter and "Seitz" Brewery Equipment. The first is produced in blue and white and gives extensive information concerning this filter together with a number of illustrations. The second pamphlet is also well illustrated, and gives particulars of beer filters for clarification and sterilisation, beer pressure regulators, cask filters, battery fillers, automatic bottling units for all outputs, and bottle washing machines of all types.

### Monel for the Food Industry

A leaflet received from Henry Wiggin and Co., Ltd., Thames House, Millbank, London, S.W. 1, deals with Monel metal and its application in the food industry. Monel is said to combine great strength and a high degree of toughness with marked corrosion-resisting properties. It is rustless and can be readily welded.

The leaflet is very well illustrated with various types of plant and equipment made from Monel which are suitable for the food industry.

### The Fireproofing of Wood

Imperial Chemical Industries, Ltd., have issued a well-produced booklet on *Faspos: the Fireproofing of Wood*. Having considered wood as a building material, "fireproof" building materials, and the action of fireproofing agents, the booklet describes the Faspos series of I.C.I. fireproofing agents. There are three products in the series, and they are all compounds based on monammonium phosphate as fireproofing agent, containing in addition valuable fungicides and penetration accelerants. They are water-soluble, crystalline, non-poisonous, and stable compounds applied in the form of aqueous solutions. The three general methods of using solutions of Faspos compounds — namely, pressure-impregnation, hot-and-cold soaking, and painting or spraying—are described in considerable detail. Information is given on the secondary effects of Faspos compounds in timber, and the influence of the compound on after-treatment. It is interesting to note that tests indicate that no difficulty should be experienced in applying any common finish to the fireproofed wood, except in the one case of silicate paints, which flake off owing to chemical interaction. These should be insulated from the salts in the wood by an oil-bound priming coat.

### Modern Gas Equipment for Laboratories

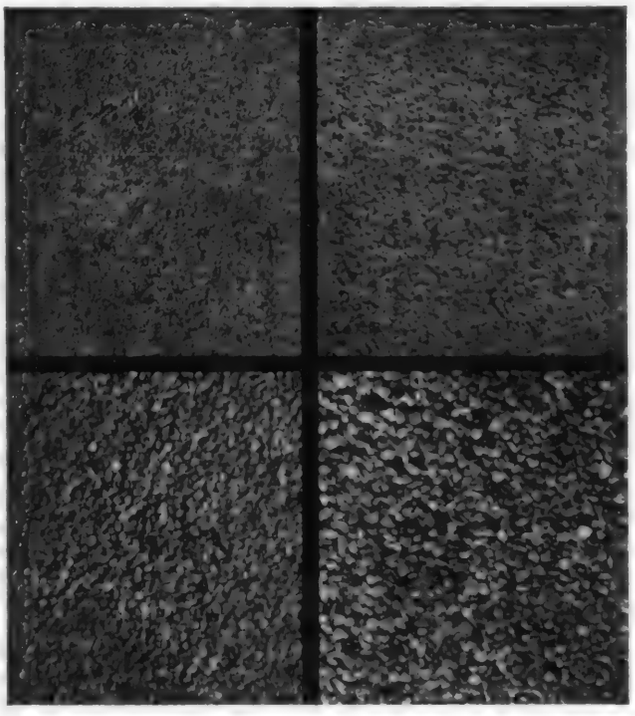
A booklet of this title is circulated by arrangement with the British Commercial Gas Association, by Griffin and Tatlock, Ltd., and describes with illustrations the wide range of the company's laboratory equipment, which is gas operated. The equipment includes various types of Bunsen burners, ovens, incinerators, furnaces, thermostats, governors, and vernier taps, etc. Griffin and Tatlock, Ltd., have also issued a leaflet describing a new colorimetric apparatus for the quantitative estimation of toxic gases in low concentrations. The apparatus has been developed by the A.B.C.M. and the Factory Department of the Home Office as a safeguard to the health of industrial workers.

### Bryan and Paton's Latest Catalogue

From F. Bryan and Paton, Ltd., 29, Paternoster Row, E.C. 4, we have received their handsome new catalogue entitled "Thermometers". With grey covers, illustrations of equipment, the booklet contains 18 large pages. The equipment illustrated consists of Electric Time Recorders, Hydrometers, Pyrometers, Long-stem Thermometers, Cold Store Thermometers, Brewers' Thermometers, etc.

### Doulton Acid-Resisting Industrial Filters

Doulton and Co., Ltd., have published a booklet on their acid-resisting industrial filters. The filters possess the following properties: Regulated porosity and permeability, high resistance to aggressive chemicals, good resistance to thermal shock and to high temperatures, high mechanical strength and adaptability for use in various types of filters, and regularity of pore distribution. These properties and their advantages are described in detail as well as other uses, besides filtration, such as diffusion and electrolysis by means of diaphragms. The booklet is well produced and illustrated; the cover illustrates the texture of a coarse-grained Doulton filter, slightly enlarged.



This illustration indicates the uniform structure of the Doulton porous ceramic filters. In each of the different grades the process of manufacture ensures regularity both in the size and distribution of the pores.

# INFORMATION and ADVICE

**Syrups—Blackcurrant Jam—Pea Canning—Pectin in Fruits—Glucose in Jam —Powdered Vegetables—Tomato Sauce—Citric Acid—Containers—Fermented Honey—Egg Albumen—Black Stains on Meat Cans—Crisp-like Cheese Product —Grapefruit—Jam Making from Canned Fruits**

### Syrups

2,080. *We have been told that syrups, which remain over after the glacing of various fruits, such as pineapples, figs, melon, etc., could be used again one year later for preserving the respective fresh fruits, after these syrups have been stored away in sealed containers for a period of twelve months. Will you be good enough to inform us whether it is advisable to use such syrups, after the period mentioned, in the process of the manufacture of glacé fruits?* (South Africa.)

Provided that the various syrups left over from glacé fruits are concentrated to about 80°. Brix and filtered carefully before storage, it is quite safe to use the syrup after twelve months. At this concentration any yeasts or bacteria which may be present tend to degenerate during storage, and if the containers are stored in a cool place there need be no fear of further trouble. In order to prevent the syrup becoming solid, it should contain about 30 per cent. of glucose or invert sugar.

### Blackcurrant Jam

2,081. *We should be very pleased if you would forward a recipe for lower fruit standard black currant jam made from pulp.* (Birmingham.)

The following is a typical recipe for a lower fruit standard black currant jam and should serve as a basis for experiment:

| | |
|---|---|
| Black currant pulp .. .. .. | 20 lb. |
| Sugar .. .. .. .. | 67 ,, |
| Liquid pectin .. .. .. | 10 ,, |
| Water .. .. .. .. | 25 ,, |
| 5 per cent. solution of magenta .. | 1 oz. |

### Pea Canning

2,082. *Would you please furnish information on the canning of dried peas?* (England.)

Generally speaking, the variety of dried pea which is most commonly used is the small "blue," which is grown extensively in Lincolnshire and on the Continent. More recently, however, marrowfat peas have also been canned.

After hand sorting and dressing, the peas are soaked overnight in water in tanks and the soaking water drained off in the morning.

The peas are then given a preliminary heat treatment in boiling water for about 3 to 5 minutes, and then cooled by again immersing in cold water. The peas are then filled into cans and covered with hot brine containing about 4 oz. of salt to the gallon and a suitable amount of green colouring matter. The cans are then passed through an exhaust box in order to bring the temperature of the contents up to about 180° F., and the lids are then spun on. The cans are processed in retorts under pressure at about 240° F. for 30 to 40 minutes, after which they are cooled and ready for labelling.

### Pectin in Fruits

2,083. *We should appreciate any information you may have on the estimation of pectin in fruits, etc.* (Birmingham.)

Many methods have been evolved, but it is doubtful whether any of them measures accurately the "gelling" power of fruits.

One of the best-known methods is that of Carre-Haynes (*Biochemical Journal*, vol. 16, p. 63), which depends on the precipitation of calcium pectate from solutions of pectin. A modification of this method as applied particularly to fruits is given by T. Macara in the *Analyst*, 1931, vol. 56, p. 39, and we would refer you to this paper for details of the method.

### Glucose in Jam

2,084. *We should be glad if you could supply us with information concerning the use of glucose in jam.* (London.)

We have been informed that it is necessary for there to be present in the finished jam sufficient material of definite crystallisation inhibiting power in order to prevent the jam from developing either surface crusting or grittiness, both of which are due to the recrystallisation of sugar.

The natural acidity of fruits inverts a certain amount of the sugar originally present in the jam, which amount of invert, dependent upon the method of manufacture and upon the degree of acidity of the fruit may, or may not be, sufficient to prevent this recrystallisation. It follows, therefore, that unless some definite addition of grain-inhibiting bodies are made, the process is hazardous. The natural function of liquid glucose in all types of confectionery is that of a grain inhibitor. Its grain-preventing properties do not depend upon the inverting of cane sugar into invert sugar, but its mere presence in suitable quantities prohibits the development of sucrose crystals. Moreover, liquid glucose is of a higher viscosity than invert sugar and, therefore, tends to give more body to a jam in which it is present. Further, glucose is considerably lower in sweetening power than either invert sugar or sucrose, and consequently it is possible to have

the correct content of soluble solids without the development of cloying sweetness. This enhances the more delicate fruit flavours and, also, the presence of glucose in suitable quantities is helpful in the retarding of mould growth in the finished jam, which might otherwise take place under prolonged or unsuitable shelf conditions.

The quantity of glucose used should, we suggest, be not less than 25 per cent. replacement of the sugar; the proportions of fruit required remain the same as for a sugar-fruit jam.

### Powdered Vegetables

2,085. *We shall be glad if you can give us formulæ for using powdered vegetables in the manufacture of canned soups, cubes, and sauces.* (England.)

In the manufacture of canned soups, the powdered vegetable is usually mixed with water into a paste and introduced into the boiling pan early in the cooking process in order to gelatinise the starch.

In the case of soup cubes, the powdered vegetable is mixed, together with the starch filling, with the flavoured soup base, which usually consists of a vegetable or yeast extract.

It is important, in preparing soup cubes, to keep the moisture content down to a reasonable level, and it should not be allowed to exceed 12 per cent. In addition, the powder mixture, before being compressed into cubes, should be sterilised by heat prior to packing. If this is not done the insect eggs, which are invariably present in the vegetable flour, will soon begin to germinate.

With regard to sauces, the only dried vegetables used in this connection, as far as we are aware, are onions and garlic. In this case the powdered material is mixed into a thin paste with a little water and added to the sauce in the boiling pans. The amount to use varies very considerably according to the method by which the powder has been prepared and the type of sauce being made, and it is almost impossible to give a formula.

### Tomato Sauce

2,086. *Can you please let me have a recipe for a tomato sauce?* (Gloucester.)

A typical formula is as follows:

| | | |
|---|---|---|
| Tomato purée | 25 | gal. |
| Pale malt vinegar (16 grain) | 8 | ,, |
| Table salt | 7 | lb. |
| Gum tragacanth | 1 | ,, |
| White sugar | 25 | ,, |
| White pepper | 8 | oz. |
| Ground ginger | 8 | ,, |
| Ground nutmeg | 4 | ,, |
| Cayenne | 1 | ,, |
| Raw onions | 4 | lb. |
| Garlic | ½ | ,, |

Place the gum in 1 gal. of the vinegar to soak for 24 hours. Add 1 gal. more of the vinegar to the gum, stir well. Peel the onions and chop fine. Place balance of vinegar in a steam pan, add sugar, salt, pepper, ginger, nutmeg, cayenne, onions, and garlic, also the gum. Stir well, add the tomato purée, bring to the boil, stirring all the time, and gently simmer for 20 minutes. Shut off steam and rub all through a fine sieve. Fill and cap.

This should be sterilised in a water bath, the temperature being brought to 195° F. in 1 hour, remaining at this temperature for 15 minutes. Run off the water and stand until cold.

### Citric Acid

2,087. *We are interested in the fermentation method of the production of citric acid, and should be glad if you could let us have some information on this subject.* (New Zealand.)

We understand that this is a very involved method and should only be attempted by experts in biological methods.

There are many patents for making citric acid by biological methods, but most of them depend upon the growth of a penicillum-like fungus, such as citromyces acting on weak solutions of cane sugar or glucose. As acid is formed it is neutralised by a suspension of calcium carbonate or other insoluble alkaline carbonate.

An excellent account of the process is given in *Industrial Microbiology*, by Smyth and Obold.

### Containers

2,088. *As you know, fruit pulps are preserved in tin containers, and such fruit pulps are boiled into jams whenever required. At present we are using a container similar to the 4-gal. square tin, and these tins are covered with lids and soldered after being filled with hot pulp. We would like to know whether these tins, after the pulp has been removed from them, could be used again to pack jam in. We have had various conflicting opinions about this matter, so we have decided to write to you and find out the truth.*

*As regards tins which are used for preserving pine-apples, melons, gherkins, etc., we find that when these fruits have to be glacéd the only method of removing same from the tins is by removing the whole top of each tin, but when this is done such tins are of no further use in our factory. Can you give us advice of changing our method where such operation is concerned, so that the whole top of each tin should not be found necessary to be removed in order that such a tin could be made use of again for preserving other fruits during the same year or the following year.* (South Africa.)

We would not recommend trying to use the same tins over again. You might consider making use of a small hand double-seaming machine for gallon cans instead of the hand-soldering apparatus. In that event you would have to use the standard gallon sanitary can, instead of the square tin.

A perfect seal can be made with this type of can, and as it is not expensive it would not be worth while using the can after opening. The wheel type of tin opener would cut round the top of the can seam so that the contents could easily be removed.

An alternative plan would be the use of glass bottles. Fruit can be filled into these and processed in the usual way. After use the same caps and bottles can be employed again in the following year. We could put you in

touch with manufacturers of cans or bottles whichever you may prefer to use.

### Fermented Honey

2,089. *English honey, 1936 crop, has fermented. Would you let us know whether it can be purified and made fit for use?* (Surrey.)

Fermentation which is just starting in honey may be checked by heating to 160° F. for one hour. If the fermentation is bad, however, the honey cannot be used as such again. There is a certain demand for honey vinegar, which may be easily prepared from fermented honey, or it may be sold to manufacturers of essences.

### Egg Albumen

2,090. *Would you please inform us of the uses of egg albumen?* (London.)

This product is used for sizing paper, fixing colours in textile printing, for sensitising photographic plates, and as a filler in leather tanning, but in these uses it has been largely displaced by other agents. It finds, however, considerable application in the preparation of marshmallows, meringues, macaroon, nougats, glacé royal, piping fondants, fudges, creams, sponges, biscuits, etc. It is unique in having a combination of foaming and heat-coagulation properties. Gelatine, saponin, whey proteins will foam; wheat gluten will coagulate on heating; but these two properties together make albumen a necessary ingredient where an aeration "fixed" by heat is required.

### Black Stains on Meat Cans

2,091. *Could you tell us the reason for the formation of black stains on the inside of canned meat containers?* (Wales.)

Such stains, we understand, are due to sulphur compounds which are liberated. It can be prevented by using cans lacquered with a special sulphur-resisting lacquer.

### Crisp-like Cheese Product

2,092. *We manufacture a crisp-like product with a cheese flavour. We shall be much obliged if you could recommend the best type of cheese to use.* (Reading.)

You do not specify whether the cheese is to be in the form of a centre or disseminated through the body of the crisp material. From the nature of the enquiry, since flavour is emphasised, the latter is more likely.

What is of great importance in this direction is the drying of the product. If the product can be subjected to efficient drying any hard cheese shredded finely (in a nut-shredding mill) and mixed with the material used for the crisp can be used. For this purpose, a uniform supply of cheese from any firm of cheese factors in this country would suit—*e.g.*, for a full flavour of home-produced cheese.

For a dry preparation of shredded cheese already used in large amounts as a cheese flavour, dried grated Parmesan would be the material which would be most suitable. This material can be supplied in the form of a fine meal and in that form would be ideal for the purpose.

### Grapefruit

2,093. *I should be glad if you can give me information on the depithing of grapefruit and how to preserve grapefruit pulps for export.* (Palestine.)

Grapefruit "dummies" may be depithed by passing the fruit under a spray of caustic soda for about ½ to 1 minute. The strength of the soda should be 2 to 3 per cent. The "dummies" are then plunged into cold water to remove any free soda and any pith remaining.

Grapefruit pulps can be preserved very successfully by sulphur dioxide. The pulp should be kept clean and filled into casks, to which is added about 1½ gallons of 6 per cent. sulphur dioxide for every 3 cwt. of pulp. The preservative is well stirred in and the cask headed up. It should then be filled up to the bunghole with water and the bung driven in. If there is any uncertainty about the bacterial cleanliness of the pulp it is advisable to bring it to the boil before preserving with sulphur dioxide as suggested above.

### Jam Making from Canned Fruits

2,094. *Would you please supply me with formulæ for jam making—cheap and best grade—using canned fruits?* (Liverpool.)

The amount of water present in the fruit should be ascertained from the manufacturer, as this will have to be taken into consideration. Usually canned fruits prepared specially for jam making contain 15 to 20 per cent. of added water.

A good quality black currant jam may be made as follows:

| | |
|---|---|
| Black currants (or 50 lb. canned fruit containing 20 per cent. of added water) .. .. .. .. .. | 40 lb. |
| Sugar .. .. .. .. .. | 69 ,, |
| Water .. .. .. .. .. | 12 ,, |
| | 121 ,, |

Boil to a weight of 100 lb.—*i.e.*, 21 lb. of water to boil off.

For a cheap jam the following will serve as an example:

| | |
|---|---|
| Black currants (or 27 lb. canned fruit containing 20 per cent. of added water) .. .. .. .. .. | 22 lb. |
| Liquid pectin .. .. .. .. | 8 ,, |
| Water .. .. .. .. .. | 12 ,, |
| Sugar .. .. .. .. .. | 67 ,, |
| | 109 ,, |

Boil to a weight of 100 lb.—*i.e.*, 9 lb. of water to boil off.

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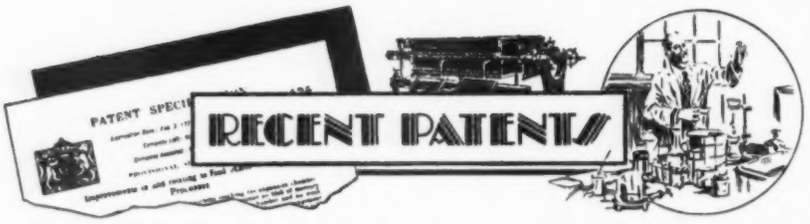
### Sweet Mustard Pickle

The amount of cauliflower to be used in the recipe for a sweet mustard pickle (No. 2,072) published in the February, 1937, issue of FOOD MANUFACTURE was given as 100 cwt.; this should have read 112 lb.




*These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

### Latest Patent Applications

663. MADAUS, F., MADAUS, G., MADAUS, H., MADAUS AND CO., DR.: Preparing triturations of fresh plants. January 8.
664. MADAUS, F., MADAUS, G., MADAUS, H., MADAUS AND CO., DR.: Preparing triturations of fresh plants. (Cognate with 663.) January 8.
709. NUNUT FOODS, INC.: Food products. January 9.
750. KLEIN, H.: Egg-grading machines. January 11.
826. HAAG, R. H. A. ESCOFET: Means for packing preserves. January 11.
848. BAKER, G. L.: Preparation of pomace. January 11.
969. TEUNISZ, W. C.: Cream separator. January 12.
1074. WRIGHT, L. M.: Treatment of tea. January 13.
1146. FRISCH, H., HOLMAN, B. W.: Manufacture of beverages containing nitrous-oxide gas. January 14.
1240. BARRON AND SON, LTD., W. S., and ROWLES, A. H.: Drying, etc., cereals, etc. January 15. (October 17, 1935.)
1787. STANDARD BRANDS, INC.: Manufacture of leavened baked goods. January 21. (United States, January 21, 1936.)
1868. SCHOU, H.: Manufacture of margarine. January 21.
1869. SCHOU, H.: Shortenings for bakery purposes. January 21.

### Complete Specifications Accepted

459,345. LEHMANN, F. B. (trading as Lehmann, J. M. (firm of)): Device for trimming moulded hollow chocolate bodies. (June 8, 1935.)
459,467. NYEGAARD AND CO. AKTIESELSKAPET: Manufacture of vitamin preparations.
459,477. LEHMANN, F. B. (trading as Lehmann, J. M. (firm of)): Device for inverting chocolate moulds in manufacturing hollow chocolate bodies. (May 28, 1935.)
459,524. I.G. FARBENINDUSTRIE AKT.-GES.: Preparations containing vitamins.
459,582. TODD, J. W., and ROWNTREE AND CO., LTD.: Manufactured articles of food or confectionery.
459,583. TODD, J. W., and ROWNTREE AND CO., LTD.: Manufacturing articles of food or confectionery.
459,635. HORST, L. A. F. VON: Preparation of hop extracts.
459,763. GES. ZUR VERWERTUNG FAUTH'SCHER PATENTE: Extraction process for vegetable oils.
460,006. BERGEDORFER EISENWERK AKT.-GES. ASTRA-WERKE: Apparatus for the determination and/or regulation of the fat content in milk.
460,097. WOOD, H. J., and HUME, E. GORDON: Method of and machine for freezing certain comestibles. (August 4, 1934.)
460,116. VERHAEGHE, A.: Soup concentrate.
460,174. LEWANDOWSKY, K.: Conching machines for refined chocolate masses.

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.*

### Abstracts of Recent Specifications

*Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.*

453,877. **Pectin.** DEHN, F. B., 103, Kingsway, London. (California Fruit Growers' Exchange, 607, South Hill Street, Los Angeles, U.S.A.)
The setting time of pectin is altered by treating a pectin sol with an acidic reagent, or by treating a pectinous material such as apple pomace or citrus peel with an acidic reagent, but without extraction of the pectin. The treatment must not be so prolonged as to destroy the gel-forming capacity of the pectin. The reagent may be an organic or inorganic acid, or a gas exerting an acidic action—*e.g.*, chlorine, hydrogen chloride, hydrogen sulphide, sulphur dioxide or trioxide. The gases may be applied under elevated pressure. The *p*H during treatment may lie between 0·1 and 2·5. The temperature should be below 85° C. Treatment of a pectin sol may be effected by leaving extracted pectin to stand in contact with the extracting acid. Pectinous material such as pomace may be treated with hydrogen chloride gas, alone or dissolved in alcohol or benzol, with acid methyl sulphate alone, or with acid in the presence of an organic liquid—*e.g.*, methyl, ethyl, propyl, butyl or amyl alcohols, ether, diethylene glycol acetone, methyl ethyl ketone, acetyl chloride, ethyl acetate, acid methyl sulphate, aliphatic or aromatic hydrocarbons, alcohols, glycols, ketones, aldehydes, amines, or ethers. Inert gases may also be used as carriers. Water-soluble carriers may be slightly diluted with water. On conclusion of the treatment the material is separated from the treating agent and is washed, if desired, in the presence of an alkali or buffering agent. It is found that in the early stages of the treatment the setting time is extended, but a prolonged treatment causes a decrease in the extended setting time. Specification 239,635 (Class 121) is referred to.

455,221. **Flour with improved baking strength.** AKTIESELSKABET DANSK GAERINGS-INDUSTRIE, 12, Snaregade, Copenhagen, Denmark.
Objection has been raised to the use of such chemicals as ammonium persulphate, potassium bromate, etc., on the grounds that they are not normal constituents of food. The addition of ascorbic acid, or its alkali salt, is now claimed; as the acid is generally accepted to be pure vitamin C, it will rank as a normal constituent of food. The ascorbic acid or salt may be introduced in the form of the well-known fruit juices containing it—for example, lemon juice or the juice of hips, neutralised with caustic soda. The amount of ascorbic acid used should be 0·0002 to 0·0005 per cent. of the weight of flour, or insufficient to influence the flavour of the bread; thus 1 (or not more than 5) litres of lemon juice should be added to 100 kg. of flour. Considerably improved baking strength of the flour is claimed. (Convention date, Denmark, March 29, 1935.)

455,691. **Butter and cheese manufacture.** H. WEISSENBERG, 16, Wilhelmstrasse, Gleiwitz, Upper Silesia, Germany.
A rapid method for the production of butter and cheese is claimed, in which the milk is coagulated spontaneously, without bacterial aid, by the addition of citric acid (8 oz. to 10 gal., or 5 gm. per litre) at room temperature. The casein and butter fat are completely separated in about 15 minutes, leaving a clear yellowish-green whey. The coagulated milk is then churned in the usual manner for about 20 to 25 minutes, and the butter removed for washing and salting as desired. The remaining buttermilk is then heated to about 42° C. (108° F.), when the casein sets to curds, which settle, the supernatant whey being clear or sometimes slightly cloudy. The whey is drained off through cloth in a warm room with fairly moist air, this being important for the quality of the cheese. The fat content of the cheese may be increased by addition of whole milk or cream to the buttermilk. The whole process takes only about an hour.

456,266. **Egg caramel.** CHOCOLAT MAGNIEZ-BAUSSART, 146, rue Colbert, Amiens (Somme), France.
Modification of caramel is claimed in which eggs are blended with the paste. The essential feature of the process of incorporation is withdrawal at beginning of cooking of a certain quantity of the syrupy caramel paste. While still at a sufficiently high temperature this portion is gradually added to the well-mixed but not beaten eggs. The resulting mixture is thoroughly stirred into the main batch of (cooked) caramel, the temperature of which is slightly raised above the normal limit (140° C. instead of 120° C.) before adding the egg mixture. The recommended proportion of egg is 1 to 10 per cent. (Convention date, France, March 28, 1935.)

# LATEST TRADE MARKS

*This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

**BECAS.** — 574,343. **Substances used as food or as ingredients in food.** BENDER AND CASSEL, LTD., 74, Brewery Road, London, N. 7. February 10.

**BLUE CROWN.**—571,813. **Fresh or dried fruits and fresh or dried vegetables.** GREENFRUITS, LTD., 8, Russell Street, Covent Garden, London, W.C. 2. February 10. (By Consent.)

**BU-KALLA.** — 572,863. **Tea.** WEBB BROTHERS, LTD., Battledown Works, Hales Road, Cheltenham, Gloucestershire. February 10.

**CHEGGS.** — 573,612. **Food preparations consisting principally of cheese, eggs, and breadcrumbs.** CYRIL WILLIAM DUDLEY, 144-6, King's Cross Road, London, W.C. 1. January 27.

**CONNETABLE.**—573,111. **Cheese.** LACTIC CREAM, LTD., 39, Blenheim Road, Holloway, London, N. 19. January 20.

**ELTEE.**—B 564,453. **Condensed milk and milk powders (for food).** L. THOMSON, LTD., Mark Lane Station Buildings, Byward Street, London, E.C. 3. January 27.
User claimed from April 30, 1930.

**ENDEAVOUR.**—573,793. **Flour.** WEAVER AND CO., LTD., Swansea Flour Mills, Swansea. January 27.

**FOSTER'S.**—560,933. **Peas (for food) in tins, packets, or the like containers.** A. W. FOSTER CO., LTD., The Cannery, Bardney, Lincolnshire. January 27.
Advertised before acceptance, the applicants alleging distinctiveness.

**GEM.**—572,332. **Butter, cheese, lard (for food), margarine, lard substitutes (for food), canned meats, fresh meat, and bacon.** A. J. MILLS AND CO., LTD., Colonial House, Tooley Street, London, S.E. 1. January 20. (Associated.) (By Consent.)

**MASCOT.** — 573,779. **Margarine.** VAN DEN BERGHS, LTD., Unilever House, Blackfriars, London, E.C. 4. February 10.

**MELTONOLA.** — 573,682. **Milk products for food.** MELTON MOWBRAY DAIRIES, LTD., 39, Victoria Street, London, S.W. 1. January 27.

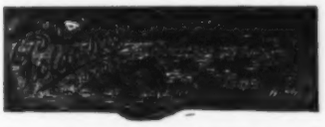
**MOOSHLA.** — 573,059. **Citrus fruits.** WHITE RIVER FRUITGROWERS' CO-OPERATIVE COMPANY, LTD., Holding No. 88, of portion of the farm "White River No. 3", Nelspruit, Eastern Transvaal, Union of South Africa. (Associated.) February 10.

Registration of this trade mark shall give no right to the exclusive use of the fruit devices.

**ORION.**—573,780. **Margarine.** VAN DEN BERGHS, LTD., Unilever House, Blackfriars, London, E.C. 4. February 3.

**OVEX.**—573,751. **Edible oils and edible fats, all being goods for use in cooking.** THOMAS HEDLEY AND CO., LTD., Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne. February 10.

**POLAR-KIST.** — 571,170. **Fish.** AKTIE-



SELSKAPET DET NORSKE FISKEFILET KOMPANI, Kjølelagret, Bratøra, Trondheim, Norway. January 20.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the word "Polar" and the fish device.

The translation of the foreign words appearing on the mark is: "Finest skin- and bone-free fish fillet".

**RISS.**—B 570,146. **Sage and onion stuffing for food.** ARTHUR J. HARRIS AND CO., LTD., 44 to 46, Upper Milk Street, Liverpool, 3. January 27.

User claimed from September 30, 1933.

The applicants undertake that this mark, when registered, and the marks Nos. 544,322 (2913), 568,552 (3037), 567,073 (not yet advertised), and 567,074 (not yet advertised), shall be assigned or transmitted only as a whole and not separately.

**SCHOLAR.** — 570,738. **Wafer biscuits.** FACCHINO'S PURITY BISCUITS, LTD., Purity Works, Old Bromford Lane, Ward End, Birmingham, 8. February 3.

**SOEATA.** — 573,377. **Bread.** WILLIAM MUIR and JAMES MUIR, trading as W. and G. Muir, 19-23, Soho Street, Glasgow, S.E. January 27. (By Consent.)

Registration of this trade mark shall give no right to the exclusive use of the word "Muir's".

**SPREX.** — 573,799. **Cooking fats.** E. LEWIS AND SONS (GLASGOW), LTD., 110, Carntynehall Road, Shettleston, Glasgow, E. 2. January 27.

**SUNNY SPREAD.**—574,022. **Honey and preserves for food.** YEATMAN AND CO., LTD., 9, Denmark Street, London, E. 1. February 3.

Registration of this trade mark shall give no right to the exclusive use of the word "Spread".

**TEANEX.**—571,134. **Rusks and biscuits.** FREDERIC LOUIS BICKER, Parkflat Marlot 25, The Hague, Holland. January 20.

**TEPEXA.** — 574,054. **Tea.** WILLIAM HENRY, 5, Holland Park, Knock, Belfast. January 27.

**TERESINA.**—574,211. **Chocolate, cocoa, and confectionery.** CHOCOLATE TOBLER, LTD., 20, Soho Square, London, W. 1. February 3.

**VIVA.**—571,319. **Malted meal.** YOUMA (ENGLAND), LTD., 107, Leadenhall Street, London, E.C. 3. January 27. (By Consent.)

**WINNER.** — 562,594. **Condensed milk.** LEON MOOCHNIK, trading as J. C. RATNER AND CO., 146, Bishopsgate, London, E.C. 2. February 3.

572,839. — **Edible fats.** BENNINGA'S BRITISH MARGARINE AND PRODUCE CO., LTD., The Margarine Works, 33, Mortimer Road, Mitcham, Surrey. January 27. (By Consent.)

573,880.—**Substances used as food or as ingredients in food.** MABEL HARRIETT MAWDSLEY, DANIEL ORMEROD MAWDSLEY, and ANNIE GRIME, trading as D. Mawdsley and Co., 4 and 6, Riga Street, Hanover Street, Shudehill, Manchester. January 20.

# NEW COMPANIES

**Aero Crisps, Limited.** (323,329.) Registered January 21, 1937. To take over the bus. of a potato crisp mnfr. cd. on by R. King at Field House, Throckley-on-Tyne, Northumberland. Nom. Cap.: £2,000. Dirs.: W. I. Thompson, 28, West View, Lemington-on-Tyne; R. King, Field House, Throckley, Newcastle-on-Tyne; J. W. Stephenson, Buckingham Street, Newcastle-on-Tyne; J. E. Bird, 25, Sugley Street, Lemington-on-Tyne; and three others.

**Barleycorn, John, Limited.** (321,126.) 57, Wharfdale Road, King's Cross, N. 1. To carry on the bus. of mnfrs., wholesalers, and vendors of food and domestic products, etc. Nom. Cap.: £1,000. Dirs.: S. J. Cullum and Annie M. Cullum, 253, Uxbridge Road, W. 12.

**Bolt Brothers (Provisions), Limited.** (321,427.) 3/4, Duke Street, Tooley Street, S.E. 1. To carry on the bus. of importers, exporters, curers of and dlrs. in bacon, butter, cheese, eggs, etc. Nom. Cap.: £1,500. Dirs.: W. J. Arrow-Smith, 42, Jupps Road, E. 13; H. S. Holt and N. Holt, Lancaster, Crackell Road, Reigate.

**Bow Cold Storage Company, Limited.** (321,421.) 32, Bedford Row, W.C. 1. To carry on bus. as proprietors of cold storage accommodation, etc. Nom. Cap.: £1,000. Dirs.: E. J. Price, Rutland House, Nicolas Road, Blundellsands, Liverpool, 23; A. M. W. Cryan, 42, Elm Park Gardens, S.W. 10.

**Brat's Milk Bars, Limited.** (321,161.) To carry on the bus. of milk bar proprietors, etc. Nom. Cap.: £1,500. Dirs.: N. de Prath, 227, Cranmer Court, Sloane Avenue, S.W. 3; A. Neumann, 21-23, Shorts Gardens, W.C. 2; Col. R. H. B. Bruce, address not stated.

**Broome and Green, Limited.** (322,380.) Registered December 28, 1936. To take over the bus. cd. on at 468, 469, and 488-496, Covent Garden Market, and elsewhere, as "Broome and Green", and to carry on the bus. of importers, exporters, and salesmen of fruits, vegetables, flowers, etc. Nom. Cap.: £90,000. Dirs.: B. G. Broome, 27, James Street, Covent Garden, W.C. 2 (permt. gov. dir.); E. G. Broome, 27, James Street, W.C. 2; E. G. Nix, 27, James Street, W.C. 2; F. A. H. Richards, 27, James Street, W.C. 2; A. B. Loudon, 85 and 87, Candleriggs, Glasgow.

**Darby, H. F., Limited.** (322,387.) Registered December 28, 1936. To carry on the bus. of fruit and vegetable merchants, etc. Nom. Cap.: £2,500. Dirs.: To be appointed by the subs. Subs.: H. F. Darby, 13, Cranleigh Road, Merton Park, S.W. 19; W. L. Pengelley, 14, South Square, Gray's Inn, W.C. 1.

**Dukes (Romsey Mills), Limited.** (322,103.) To take over the bus. of millers, etc., cd. on by James Duke and Son, Ltd., at Town Mills, Romsey, Hants. Nom. Cap.: £10,000. Dirs.: J. Duke, Curls, Bishop's Waltham, Hants (permt. mang. dir.); T. J. Duke, Fir Tree, Botley Road, Bishop's Waltham.

**Eastwoods Boneless Beef Company, Limited.** (321,234.) 2/3, Cowcross Street, E.C. 1. To carry on the bus. of dlrs. in boneless beef and meats, etc. Nom. Cap.: £5,000. Permt. dirs.: A. I. Eastwood, Amenbury, Harpenden, Herts; R. Eastwood, Calderbrook, Manor Road, Wallasey, Ches; H. G. Worboys, Dunstan, 84, Valance Road, N. 22; M. Bucka, 1, Summerland Mansions, The Broadway, Muswell Hill, N. 10. Remun. of dirs.: As voted by the company.

**Eyam Dairies, Limited.** (321,236.) To take over the bus. of (1) a dairyman cd. on by W. Barber at Olde House Farm, Eyam, and 36 and 38, South Street, Sheffield, and (2) an ice mcht. cd. on by D. Westmoreland at 36 and 38, South Street, Sheffield. Nom. Cap.: £2,250. Dirs.: D. Westmoreland, 38, South Street, Sheffield; W. Barber, Olde House Farm, Eyam; A. Austins, 82, St. James Road, Eyam.

**Glucose and By-Products, Limited.** (322,045.) 62, Finsbury Pavement, E.C. 2. To carry on the bus. of refiners and mnfrs. of glucose and allied products, etc. Nom. Cap.: £10,000. Dirs.: H. Zinder, 36, Orchard Court, W. 1; J. Lifszyc, 12a, Windsor Court, N.W. 11; C. Stikans, 12a, Windsor Court, N.W. 11.

**Harmil Bakeries, Limited.** (321,952.) To take over the bus. of a baker cd. on by H. Mills at Harmil Bakery and Uttoxeter Road, Longton, Stoke-on-Trent. Nom. Cap.: £5,000. Dirs.: H. Mills, Strathmore, Park Avenue, Longton, Stoke-on-Trent (permt. mang. dir.); Claire E. Mills, Strathmore, Park Avenue, Longton, Stoke-on-Trent; E. G. Mills, Strathmore, Park Avenue, Longton, Stoke-on-Trent; G. Mills, Strathmore, Park Avenue, Longton, Stoke-on-Trent.

**Instant Service, Limited.** (322,357.) Registered December 28, 1936. To carry on bus. as caterers, milk shop proprietors, etc. Nom. Cap.: £5,000. Dirs.: W. J. Green, 102, Shoe Lane, E.C. 4; J. Byrne, 139, Gray's Inn Road, W.C. 1; W. Doyle, address not stated; Clara Allen, address not stated.

**Jim Kendall's Milk Bars, Limited.** (322,265.) Registered December 23, 1936. To carry on the bus. of milk producers and dlrs., etc. Nom. Cap.: £500. Permt. dirs.: J. Kendall, Wood Nook Farm, Hipperholme, Yorks; P. S. Kirby, 11, Blenheim Terrace, Leeds; J. B. Butterick, 23, Park Row, Leeds; W. Mankin, 7, Queensway, Whitkirk.

**Kerr, J. and W., Limited.** (322,460.) Registered December 30, 1936. 1-9, Rocky Lane, Aston Cross, Birmingham. To take over the bus. of a mineral water mnfr. cd. on by J. W. Kerr at Birmingham. Nom. Cap.: £7,000. Dirs.: J. W. Kerr, Silver Birch Road, Erdington, Birmingham (permt. gov. dir.); A. A. Kerr, Emmanuel Road, Wylde Green, Birmingham; Betsy M. Macrae, 1, Rocky Lane, Aston Cross, Birmingham.

**Mardorf, Peach and Company, Limited.** (322,501.) Registered December 31, 1936. Old Trinity House, 5, Water Lane, E.C. To take over the bus. of flour importers cd. on at Old Trinity House, Water Lane, E.C., as "Mardorf, Peach and Co." Nom. Cap.: £25,000. Dirs.: To be appointed by the subs. Subs.: F. W. Peach, Old Trinity House, Water Lane, E.C.; F. C. Mardorf, Old Trinity House, Water Lane, E.C.

**Paul Igenlath, Limited.** (322,428.) Registered December 29, 1936. Monument Buildings, Monument Street, E.C. To carry on the bus. of glue and gelatine mchts. cd. on at Monument Buildings, E.C. 3. Nom. Cap.: £10,000. Permt. dirs.: P. Ingenlath, 4, Newfields, Dartmouth Road, S.E. 23; L. G. Browse, 17, The Mead, West Wickham, Kent.

**Radford, J. (Haverhill), Limited.** (321,310.) 28, Queen Street, Haverhill, Suffolk. To take over the bus. of John Radford cd. on at Haverhill, and to carry on the bus. of millers and farmers, etc. Nom. Cap.: £3,000. Dirs.: Mabel R. Weight, Locarno, Jameson Road, Clacton-on-Sea; Iris Dunlop, Lynton, Fourth Avenue, Frinton-on-Sea.

**Rose and Company (Produce), Limited.** (321,934.) 36, St. James's Market, Bradford. To take over the bus. of wholesale fruit and vegetable mchts. cd. on at Bradford as "Rose and Co." Nom. Cap.: £1,000. Dirs.: J. Pocklington, Elm Tree Villa, Wistow, Yorks (permt. mang. dir.); H. Ellis, 16, Bolton Crescent, Bradford.

**Southern Produce Company, Limited.** (321,766.) 76, Finsbury Pavement, E.C. 2. To take over the bus. of wholesale fruit and produce mchts. cd. on at 18-20, "Market," Arundel Street, Portsmouth, by H. Green and E. S. Carrick. Nom. Cap.: £1,500 in £1 shares. Dirs.: E. S. Carrick, 43, Eastbourne Gardens, Whitley Bay, and H. Green, 455, Brixton Road, S.W. 9.

**Tees Bottle Works, Limited.** (321,366.) Bridge Road, Stockton-on-Tees, Co. Durham. To take over the bus. of glass bottle mnfrs. cd. on at Stockton-on-Tees as "W. Proctor and Co." Nom. Cap.: £5,000. Dirs.: W. Proctor, Laburnums, Hartburn Lane, Stockton-on-Tees (permt.); A. H. Finch, Riftswood, Egglescliffe, Co. Durham; A. Imeson, The Briars, Saltburn-by-the-Sea.

**Thorp Brothers (Cream), Limited.** (321,852.) To take over the bus. of mnfg., producing, and dealing in cream and cream products cd. on by W. Thorp, senr. Nom. Cap.: £5,000 in £1 shares (3,000 ord. and 2,000 pref.); Dirs.: W. Thorp, senr., 33, Park Road, Battersea Park, S.W. 11 (permt.); W. Thorp, junr., Royal Automobile Club, Pall Mall, S.W. Qual. of dirs.: £1. Remun. of dirs.: As voted by the company.

**Ye Abbot's Kitchen, Limited.** (321,024.) To carry on the bus. of caterers, etc. Nom. Cap.: £4,000 in £1 shares (2,000 ord. and 2,000 pref.). Dirs.: W. L. Darbyshire, Ridgeways, High Trees Road, Reigate, Surrey (permt. gov. dir.); Marion Darbyshire, address not stated. Qual. of gov. dir.: 100 shares. Subs.: G. C. Dove, 2, Howard Street, W.C. 2 (clk.).

*The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.*